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CORBETT NATIONAL PARK PLATINUM JUBILEE

PLATIMUM JUBILEE 2011
75 GLORIOUS years
CORBETT NATIONAL PARK

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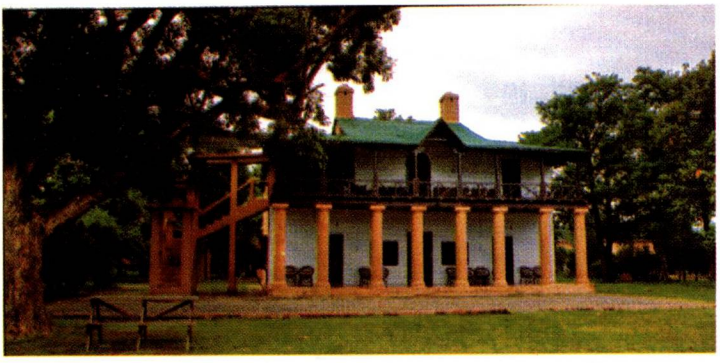
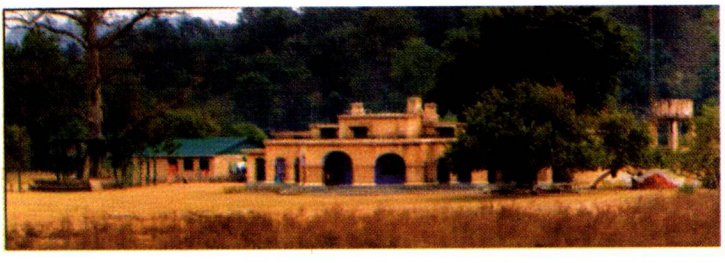


Old FRH Dhikala



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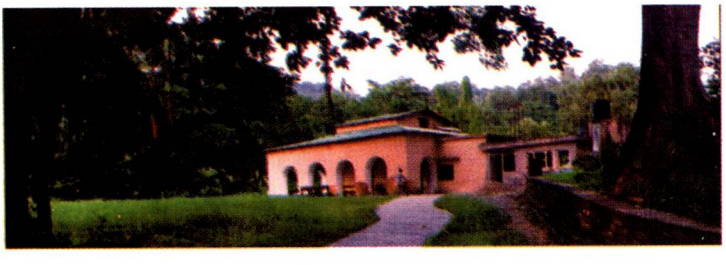

FRH Jhirna

Editorial

Corbett National Park is the first NP of the country and Wildlife Preservation Society of India (WPSI) is the oldest organization of North India voicing concern about Wildlife Conservation. Society's journal "Cheetal" is now over 52 year old. It was a noble idea to bring out a special issue of Cheetal on this occasion to commemorate the glorious 75 years of Corbett National Park. Corbett NP known as land of roar, trumpet & song to denote its fame for tigers, wild elephants and bird life is a heaven for nature lovers. It has been attracting wild lifers, conservationists, nature lovers and anglers for over 60 years. Anybody visiting Corbett NP once would always crave to come back again and again. It is a heaven for bird watchers with over 600 species of birds, many of them rare, found in it. The construction of a hydropower dam in early seventies has created a water body as large as 80 sq.km at maximum water level. This adds to the beauty and grandeur of the Park sheltering huge size Maheseer & Goonch fishes, Maghar, Ghariyal, turtles and smooth coated otters. The most high profile conservation initiative "Project Tiger" was inaugurated in CNP in 1973. The initial area of Corbett Tiger Reserve (CTR) was 521 km^2 which was increased to 1288 sq km in 1991. Today due to good buffer area managed by CTR, the tiger density in it is one of the highest anywhere in the tiger range. CTR together with its adjoining areas including Rajaji NP is the North- Western limit of tigers and Asian elephants in their existing range and becomes crucial to their conservation. With Ramganga and its tributaries supplying perennial water it attracts a large number of wild elephants during summer. It has one of the best male female ratio(1:3). One can see majestic tuskers roaming around in all the parts of the CTR. Congregation of Cheetal herds of plus 500 individuals is a common sight around Dhikala and *Fulai Chuurs* during summer. Pythons, King Cobras and monitor lizards can be encountered during late summer and rainy season. The habitat of Corbett is unique with Sal forests and mixed forests interspersed with grasslands. The riparian habitat is also significant alongside Ramganga and its tributaries. After relocation of villages from the southern boundary and management of sizable buffer by CTR management the anthropogenic pressure is also with in sustainable limits.

The greatest challenge in Corbett is addition of some most crucial areas in its buffer zone or management of these areas under the Management Plan of CTR. These areas are Lansdown Forest Division and part of Ramnagar Forest Division. Research has shown that tiger density in Kotari Range of Lansdown FD is as high as 9 to 10 tigers per 100 sq.km. In Chilla range of Rajaji NP camera trapping by Wildlife Institute of India has revealed presence of large number of transient tigers zone RNP for short time and then disappearing. Poaching of transient tigers can not be ruled out if buffer management is poor. Gujar relocation from Sonanadi Sanctuary is an urgency as repeated evidences of involvement of Gujars in poaching cases has come to light from Kalagarh Tiger Reserve Division. Congregation of tourist resorts on Ramnagar- Ranikhet road is causing problems due to loss of connectivity between Corbett and Forests across Kosi River. Gaula connectivity has already been lost. Relocation of Sunderkhal village near Dhangarhi gate is also important as the recent man eating cases from this village have defamed the tiger and adversely affected the morale of the management. Tourism pressure from Dhikala zone in particular and other areas in general needs to be strictly controlled to save the habitat and wildlife. Eco-development in adjoining villages is also very important to win the confidence of local villages. Remaining families of Laldhang village must be shifted as forest has already been cleared at new site to eliminate the disturbance. Corbett NP is a national heritage and needs to be conserved with utmost care. Another 25 years, before we boast of 100 glorious years of CNP at the time of its Golden Jubilee, are crucial as pressures are building very fast. In order to celebrate a grand Golden jubilee of CNP all of us must join hands together to strengthen conservation of Corbett NP.

Honourable readers are requested to send their valuable opinions and feed back to the following address:

asnegi1943@gmail.com / kalarajendra12@gmail.com
Postel Address : Hony. Secretary Wildlife Preservation Society of India
7, Astley Hall, Dehradun - 248001

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Understanding and saving Corbett's landscape

*Dr. AJ.T.Johnsingh, Nature Conservation Foundation, Mysore and WWF-India.

"I have come to the end of the jungle stories I set out to tell you and I have also come near the end of my man-eating hunting career" are the words of Jim Corbett at the end of a most dramatic account of the shooting of a man-eater, the Thak man-eater, in which Corbett lay precariously on a rock, called to the tigress and then shot her at point blank range.

For me, those stories were the beginning of a life-long fascination for the heroic hunter-conservationist and the hills and the animals that he brought to life with his pen, wielded as effectively as his gun. My introduction to Jim Corbett was in my boyhood and it was through an accidental discovery of an excellent Tamil translation of *The Man-eaters of Kumaon* in the library of Nanguneri, a small town at the southern end of Tamil Nadu close to where I grew up. The discovery of the translated book, written by TJ Ranganathan, was on a Sunday forenoon when I had come to the local church along with my family members. I made use of the time before lunch to read as much as possible and then hid the book in one corner of the library so that I could come and read it the next Sunday. Reading the book made me imagine the wonderland of Kumaon with forests full of tiger and *jarao* (the hillman's name for sambar) with horns as big as the branches of an oak tree and rivers full of golden mahseer, one of the beautiful wildlife species of the country.

After school, I went to St. Xavier's College, Palayankottai in 1960 to further my studies where I read in English all the books of Corbett. My fascination for Corbett and the land he wrote of, grew profoundly. When our family went for our holiday trips to the foothill forests in the adjacent Western Ghats (which is now part of the Kalakad-Mundanthurai Tiger Reserve) me and my brothers sat and discussed for endless hours about Jim Corbett as a hunter, his man-eating tigers and leopards and the large mahseer he had caught. Being young and inexperienced I was afraid to walk alone in the jungle fearing man-eaters which never really existed in the Western Ghat's forests with which I was familiar.

My life and career took me to different places but after 20 years or so, as ordained I joined Wildlife Institute of India (WII) in 1985 as a faculty member. As chance would have it, WII was situated in the Doon Valley, not far from the locations where Jim Corbett had caught the 50 pound mahseer for his dinner, killed the 13-14 feet king cobra, shot his man-eating leopards and tigers. Interestingly, I had made a visit to WII in November 1983 with the intention of scouting for a job. That visit gave me an opportunity to visit the adjoining Rajaji NP. Accompanied by an officer who had been working there for the last four years, I visited the Chilla Range where the steep and the rugged Shivalik hills vividly brought to my mind the description of the goral habitat written by Corbett in the chapter on Champawat man-eater. The wildlife biologist in me said that there should be goral in those steep hills but the officer told me that there were no goral. In the later years when I surveyed the Park for goral with two of my wonderful colleagues, G.S. Rawat and S. P. Goyal, we realized that there were perhaps several hundred goral in the Park.

Jim Corbett, an Irish man was born in Nainital in 1875 and spent his youth close to nature in the forests around Nainital and Kaladhungi. He is most famous as the hunter who shot down 10 notorious man-eating tigers and leopards in the Kumaon hills (Rudraprayag leopard was shot in the present day Garhwal hills), which had together killed some 1200 people. His prime years as the

101 Magnolia Esteem Garden, Sahakrara Nagar Bangluru – 92 e- mail ajt.johnsingh@gmail.com

messiah who rid the hills of the terrors stretched 32 years between1907 to 1938. He wrote in wonderful, terrifying detail the accounts of his hunts which are still relished worldwide by readers. The Champawat man-eater, responsible for 436 kills, had been driven out of Nepal to Kumaon and was Corbett's first man-eater. An inexperienced Corbett spent the first night sitting on the ground waiting for the man-eater. Fortunately for him the man-eater was not in the vicinity, because Corbett was found fast asleep in the morning at his look-out when his men came looking for him. In spite of several attempts Corbett could not shoot the temple tiger (which was not a man-eater), a failure that had been predicted by the Devidhura priest. The Mukteshwar man-eater turned to man-eating as it had lost one eye and had received some fifty quills in an encounter with a porcupine. The Panar man-eating leopard, reported to be responsible for 400 deaths, was killed in 1910. Corbett used a twelve-bore double-barreled shot gun loaded with slugs to slay the man-eater.
Corbett shot the Talla-Des man-eaters, a tigress and her grown up cubs, who were together responsible for 150 deaths, in a splendid show of marksmanship one after the other. The tigress, however, already lame with 20 porcupine quills in her right leg and shoulder, managed to escape. One of the more gripping pieces of prose in his books is his account of how he tracked the tigress – with a swollen face and neck and closed left eye as a result of the injury to his left eardrum caused by a a heavy high-velocity rifle discharging close to the ear. Having survived several days and nights in the man-eater country, he assumed almost saintly status in the esteem of the local people. They considered the incident of Corbett and his men seeing the lights in the Sharada gorge as a divine phenomenon because they had been on a mission to help the hillfolk over which the Purnagiri goddess was said to keep watch. Interestingly, Corbett himself was superstitious. Once, he had killed a nearly 14-foot cobra with stones, and he considered that to be a good omen as he started out on his hunt of the Kanda man-eater.

Over the years my association with WII gave me sufficient opportunities to visit all the important locations in Corbett's landscape. Several times I visited Kaladhungi, where Jim Corbett's winter home has been converted into a museum. I occasionally saw and photographed the Nainital Lake in which he had tried to stop night fishing of mahseer in the year 1923. Several times when I joined the forest officer trainees and the wildlife biology students on their study tour to the mountains of Uttaranchal, I passed through Rudraprayag, where Corbett shot its infamous man-eating leopard on 1st May 1926 from a *machan* on the mango tree on the 11th night of his vigil. Amazingly, the mango tree still stands.

My first long trip exploring the Corbett landscape was in April 1993, in the company of G. S. Rawat. I visited the locations where Corbett tried to shoot the Temple tiger and where he shot the Mukteshwar man-eater. The trail where Corbett shot two goral while on the track of the Champawat man-eater was now teeming with livestock and human trails, which meant that there are no goral anymore. I walked from the Chalthi bridge to Chuka village (20 km) along the Ladhya river, crossing it several times, to see the habitat in and around Chuka and Thak villages where Corbett shot two man-eaters in the years 1937 and 1938. One evening, before settling for the night in the house of Ummed Singh, the headman of Chuka village who had seen Corbett when he was 10 years old, we went to the confluence of Sharada and Ladhya to try and catch a mahseer. On the river bed near the confluence we also looked for sambar tracks but didn't find any. We had no luck with mahseer that day although Corbett talks about catching enough fish at the confluence to feed a camp of 30 people while he was hunting the Chuka man-eater. That evening nevertheless is

The author with Mr. A.S. Negi in Corbett country
Photo : A.J.T. Johnsingh

Low hills & meandering rivers of Corbett country
Photo : A.J.T. Johnsingh

Rich Biodiversity of Corbett National Park
Courtesy : Director CTR

The crystal clear water of Ramganga in Corbett National Park
Courtesy : Director CTR

memorable as we were rewarded with the sighting of five goral coming down to the river from the Nepal hills across the Sharada river.

The next morning, around 0900 hrs, we left for Thak which involves a steady and stiff climb of nearly four kilometers from Chuka. While approaching Thak village I remembered the mango tree and the spring from which both the Thak man-eater and Corbett had drunk. The mango tree and the spring with clean water were still there, and it was an exhilarating feeling for me to quench my thirst there after the climb under the hot April sun. When the Thak man-eater was on the prowl, the Thak village had been deserted. Curiously, we found Thak again deserted – this time not because of a man-eater, but because the village population, who were all Brahmins, had found lucrative jobs in and around the Poornagiri temple situated a few kilometers from the village. Only one family of a Rajput was living about 100m from the abandoned village.

Five winters passed before I could make another trip to Corbett's landscape. This time, accompanying me was A.S. Negi who would eventually retire as the Chief Wildlife Warden of Uttaranchal. In May 1998 we traversed the areas where the Kanda, Mohan, Chowgarh and Talla Des man-eaters had established a reign of terror before finally falling to Corbett's bullets. The climax of this journey was the visit to the Talla-des man-eater area (1800 m), which involved a steep climb from Sem village, just north of the confluence of Sharada and Ladhya. The Thak man-eater had killed the Sem village headman's mother very close to her hut. Corbett, on his way to shoot the Talla Des man-eater describes the same climb, with the April sun blazing on their backs and without a single tree to shade them, as one of the most exhausting climbs he and his men had ever undertaken. We were dreading the climb under the hot May sun but fortunately for us, a hail storm the previous day had cooled temperatures and that eased our toil.

Much water had flowed down the Ladhya river before I could make yet another trip to Chuka in November 2002. This time my companion was Dhananjai Mohan of the Uttarakhand Forest Department, an eminent bird watcher. We had the guidance of the forest staff and made it to Chuka from Chalthi without so much as having to dip our toes in the Ladhya waters. . We found lots of sambar tracks on the river bed. Headman Ummed Singh attributed the reappearance of sambar to the presence of Special Services Bureau paramilitary stationed along the Indo-Nepal border that deters Nepali poachers from incursions.

In December 2005, I set out on my next trip with Dhananjai and this time Ravikiran Goverkar, a fine young forest officer from Maharashtra who is passionate about plants and Jim Corbett joined us. On this trip, we descended from Manch in the Talla Des area to Chuka along a 22 km trail slippery with scree. Our night stay in Chuka was in the small forest *chowkie* lit by a single hurricane lantern, harking back to the story of the brave Tashildar in the story of the Champawat man-eater. The Tashildar, against much exhorting by Corbett not to undertake the journey in the dark with a man-eater at large, had walked 4 miles to the place of his stay in the company of a man carrying only a hurricane lantern. Much to Corbett's relief, he had returned safely in the morning. The day we stayed in Chuka we walked to Kotkendri (900 m) and then to Thak (750 m) as our intention was have a drink from the landmark spring at the base of the mango tree. On reaching Thak, where the Rajput family was living hardly 100 m from the abandoned village, we found that a landslide and dense lantana undergrowth had totally obliterated the path to the village and the mango tree. On our descent to Chuka, with the help of our local gude, we tried to locate the rock on which Corbett lay down and shot the Thak man-eater but we could not find it. . On three of the trips,

the first one with Rawat, and the two with Dhananjai, we returned to Tanakpur via Kaladhunga and along the Sharada gorge where Corbett had seen the votive lights on 5th April 1929.

My last two trips to Corbett's hunting grounds were with Bivash Pandav from the Wildlife Institute of India, and as memorable as all my previous trips. In January 2006 we reached Kala Agar (1760 m) forest bungalow where Corbett had camped when he was on the trail of the Chowgarh tigers. In the golden light of the setting sun we could see the snow covered Nanda Devi peak (6400 m) far to the north. After spending the night in the forest bungalow, which unfortunately was falling steadily into disrepair, we drove to Dalkania (1520 m), walked to Banolia forest bungalow (1550 m), Durga Peepal forest bungalow (650 m) and then to our final camp - Chorgalia forest bungalow along the Nandhaur river, covering a total distance of 60 km. Exerting ourselves on this trail, we marveled at the physical fitness of 54 year old Corbett who spent 64 hours in the forest without food, except for a drink of fresh milk sweetened to excess with jaggery; blithely slept three nights up a tree, shot and then painstakingly skinned a grown-up tiger cub with his pen-knife; and then returned to his camp 15 miles away carrying the skin. According to the great hunter, this skin which weighed 40 pounds at the beginning of the walk seemed to weigh 200 pounds at the end. Quite understandable! During our trek, we were concerned by the fact that the rhododendrons were flowering in January, there was no snow even on the 2740 m Kauli ridge (both of which we took to be the warning signs of climate change) and that there were hardly any mahseer in the same Nandhour river where Corbett and the Ibbotsons, one day in October 1938, had caught 125 mahseer while on their way to Chuka to shoot the Thak man-eater.

Having travelled on Corbett's footsteps in his man-eating tiger landscapes, I was keen to know more about the terrain where he shot the famous Rudraprayag and Panar man-eating leopards. In the company of A.S. Negi and Bivash Pandav I made this trip in December 2010. The last kill, a boy, was made on 14th April 1926 in Bhainswara village 18 miles (c. 29 km) from Rudraprayag. The gripping account on Corbett's visit to this village is worth reading. Corbett reached the village when the sun was setting – having started with a 12 mile walk that morning, followed by a a 4000 feet climb soon after a late breakfast.. He used the body of the boy as a bait and kept a long vigil at night on the veranda in the flimsy cover of a straw heap waiting for the leopard. He had heard the noisy fight between the man-eater and the local territorial leopard which totally thwarted his chances of shooting the man-eater. He had dejectedly accomplished a long and even more tiring return walk to Rudraprayag. The villagers on the way did not express their disappointment. Instead, to sooth his depressed feelings, they evinced a faith which, as Corbett said, could move mountains and whose philosophy was that no human or animal can die before its appointed time. In Molkha khal village, barely a kilometer from Bhainswara, we asked 62 year old Gajesingh Chaudhary, an Army retiree, if he had any recollection of stories of that particular killing by the Rudraprayag man-eater. Chaudhary told us that his 92 year old mother, who had recently deceased, used to speak often about the incident and the visit of a white man who had came to try and kill the man-eater of Rudraprayag. Unfortunately, in Sanouli village where Corbett shot the Panar man-eater in September 1910, exactly a hundred years ago, no one could recall any stories even of the final face-off.

Over the decades what has happened to Corbett's landscape and the animals he had written about? Sadly, as a result of the unprecedented increase in human and cattle population and other developments including encroachments, roads and increasing traffic, Corbett's landscape and

other parts of Uttarakhand now present a decimated look. Plantations and weeds have replaced the natural vegetation, uncontrolled poaching has drastically reduced the abundance of large mammals including tiger, with recent reports suggesting that around Corbett Tiger Reserve alone poachers kill about 20 tigers each year, and developments along the Ganga and Gola river have contributed to the fragmentation of the once continuous tiger and elephant habitat.

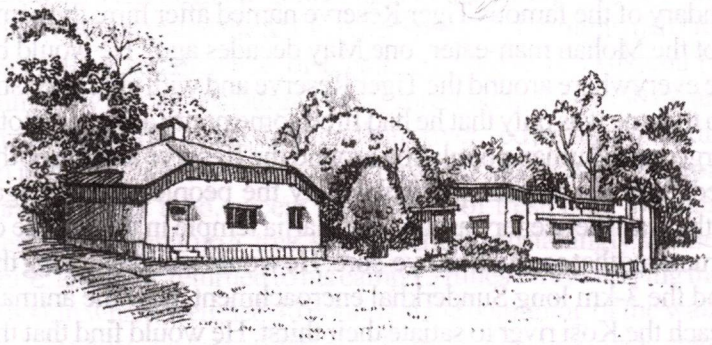
What would Corbett see if he walked today from Ramnagar railway station to Kartkanoula, along the eastern boundary of the famous Tiger Reserve named after him; the same road he walked on his way to shoot the Mohan man-eater one May decades ago? He would be happy, but surprised, to see his name everywhere around the Tiger Reserve and with characteristic humility, he would say that his claim to fame was only that he had fired some pretty accurate shots. He would be saddened to see the burgeoning human population around the Reserve and to see the amount of firewood being extracted from the forests, particularly by the people of Ramnagar township. He would not appreciate the way the scenery around the Garjia temple in the middle of Kosi river has been marred by constructions that are such an eye-sore. He would wonder, seeing the line of tourism resorts in Dhikuli and the 3-km long Sunderkhal encroachment, how the animals from the Reserve are supposed to reach the Kosi river to satiate their thirst. He would find that the marsh on the bank of Kosi opposite of Gargia forest bungalow, where he heard a colony of frogs making sound like stones falling off the cliff, does not exist anymore and its place has been taken over instead by the Corbett Riverside Resort.

How can we honor the gentle and immensely courageous man who was generous and kind, just and loving and who wrote the first and the finest plea to save the tiger in India? The best way to honor him may be to try and restore the health of the forests in the entire *babhar* tract in Uttarakhand by evicting encroachers; growing thousands of trees for fodder and firewood for the poor of the land so that their dependency on the forests can be reduced; build speed breakers on the paved roads that go through the forests so that the speeding vehicles will not kill animals; restore the broken connectivities (Chilla-Motichur and Gola for example); and plead with the people to give up poaching and definitely not use such barbaric means such as dynamiting to kill the mahseer. One can be confident that the people of Uttarakhand, who are lovable, large-hearted and have won many laurels in the battle fields, would take up these challenges and make the *babhar* landscape in Uttarakhand a haven for people, tiger and mahseer.

कार्बेट नेशनल पार्क में मेरे 18 वर्ष

*एन0 एस0 नेगी

मैंने दिनांक 1 दिसम्बर 1952 से 29 फरवरी 1984 तक वन विभाग की सेवा में बिताये। इससे पूर्व मैंने नौ साल आठ माह फौज में नौकरी की। मेरी वन विभाग में फौरेस्टर के पद पर पहली नियुक्ति देहरादून वन प्रभाग में हुई। यहाँ पर छः साल फौरेस्टर के पद पर सेवा के बाद फरवरी 1959 को मुझे इसी वन प्रभाग में सहायक वन्य जन्तु प्रतिपालक के पद पर प्रोन्नत किया गया। इस पद पर दो साल काम करने के बाद मुझे फौरेस्टर ट्रेनिंग में भेजा गया और ट्रेनिंग समाप्त होने पर मेरी पोस्टिंग कार्बेट नेशनल पार्क में सहायक वन्य जन्तुपालक के पद पर हुआ।



1 फरवरी 1962 को मैंने कार्बेट नेशनल पार्क में उपस्थिति दी और जुलाई 1979 तक यहां पर लगभग साढ़े सतरह साल तक पार्क की सेवा में रहा। इस पूरी अवधि में मैं इस पार्क के मुख्य पर्यटन केन्द्र ढिकाला में रहा जहां मुझे वहां के प्राकृतिक सौन्दर्य तथा शांत वातावरण का भरपूर आनन्द मिला।

यों तो कार्बेट नेशनल पार्क की स्थापना वर्ष 1936 में उ0प्र0 के तत्कालीन गवर्नर सर हेली के नाम से "हेली नेशनल पार्क" के नाम से हो गई थी। किन्तु यहां पर किसी प्रकार की वन्य जीव संरक्षण से संबंधित गतिविधियाँ वर्ष 1957 तक नहीं थी। वर्ष 1957 में उ0प्र0 सरकार ने पर्यटन को प्रोत्साहन देने के उद्देश्य से इसका प्रचार प्रसार आरम्भ किया और पार्क में पर्यटकों के आवास व भ्रमण की व्यवस्था आरम्भ की। इस व्यवस्था के अंतर्गत ढिकाला में जहां एक वन विश्राम भवन पहले से ही मौजूद था, एक अनेक्सी और एक स्टूडेन्ट डारमेटरी वर्ष 1957 में निर्मित की गई। इस प्रकार आरम्भ में पर्यटकों के ठहरने के लिए ढिकाला में कुल 23 बैड उपलब्ध थे।

पर्यटकों के पार्क में भ्रमण के लिये दो पालतू हाथी, मालनकली व चन्द्रकली थे। पर्यटकों के पार्क भ्रमण तथा आवासीय प्रबन्ध के लिए मेरे अलावा चार वन्य जन्तु रक्षक, तीन विश्राम भवन चौकीदार, दो महावत, दो चाराकटर तथा एक माली भी रखा गया था। विश्राम भवनों में रोशनी की व्यवस्था के लिए एक तीन किलोवाट क्षमता का जेनेरेटर था तथा ढिकाला के समीप बहने वाली रामगंगा नदी से पीने का पानी पम्प करके ओवरहेड टैंक से पाइप लाइन द्वारा विश्राम भवनों में पहुँचाया जाता था। बिजली पानी की इस व्यवस्था में कई बार जेनरेटर या पम्प में खराबी आने से अवरोध हो जाता था तब वैकल्पिक व्यवस्था के रूप में बालटियों से पानी ढोकर तथा लालटेन और मोमबत्ती जलाकर को जाती थी। वर्ष 1976 में कालागढ़ से ढिकाला तक बिजली लाइन लगाकर बिजली की व्यवस्था की गई। पानी की अच्छी व्यवस्था वर्ष 1972 में गढ़वाल जल संस्थान द्वारा बोर वैल द्वारा की गई जो अब सुचारू रूप से चल रही है। बिजली लाईन के खम्बों को जंगली हाथियों द्वारा गिराये जाने से पहले दस वर्षों में आठ–दस हथियों की बिजली की चपेट में आने से मौत हो गई थी।

आरम्भ में पार्क की व्यवस्था निम्न प्रकार थी –

पार्क का कुल क्षेत्रफल 376 वर्ग किलो मीटर था। इसकी उत्तरी पश्चिमी सीमा रामगंगा नदी तक थी। ढिकाला के सामने वाला रामगंगा नदी का दाईं ओर का भाग मंडाल शूटिंग ब्लाक था। वर्ष 1967 में पार्क की उत्तरी सीमा का कांडा विश्राम भवन से धार तक विस्तार कर इस भाग को पार्क में मिलाया गया जिससे पार्क का क्षेत्रफल 520 वर्ग कि0मी0 हो गया।

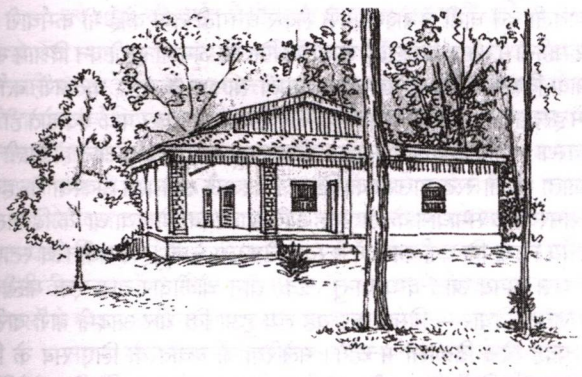
पार्क में वनों का रख–रखाव, अग्नि सुरक्षा, सड़क निर्माण तथा सभी प्रकार के फारेस्टरी ऑपरेशन टेरिटोरियल वन प्रभागों (कालागढ़ तथा रामनगर) द्वारा कार्य योजना के अनुसार किया जाता था। इन कार्यों की देख रेख की जिम्मेदारी निम्न टेरिटोरियल रेंजों की थीं :

साउथ पतली दून रेंज	– मुख्यायल ढिकाला
धारा रेंज	– मुख्यालय कालागढ़
मलानी रेंज	– मुख्यालय रामनगर
मंदाल रेंज	– मुख्यालय कांडा

ग्रीन कॉटेज, बाला हिसार, मसूरी

एक सहायक वन्य जन्तु प्रतिपालक तथा चार वन्य जन्तु रक्षक जो ढिकाला में तैनात थे उनका काम पर्यटकों को पार्क भ्रमण कराना, उनकी आवासीय व्यवस्था तथा वन्य जन्तु अवलोकन के लिये आवश्यक प्रबन्ध करना था। पर्यटकों को बाघ दिखाने के लिए ढिकाला के समीप ही रामगंगा नदी के किनारे एक घनी व ऊंची घास की बोझी (Thicket) जिसे शेर बोझी के नाम से जाना जाता था। रात को शिकार की तलाश में बाघ अक्सर इधर से गुजरते थे और बंधे हुए पड्ढे (Buffalo Calf) को मारकर इस बोझी में घसीट कर ले जाते थे। अगले दिन प्रातः ही एक वन्य जन्तु रक्षक इस शेर बोझी में जाकर देखता था कि बंधा हुआ पड्ढा अपने स्थान पर है या नहीं। यदि पड्ढा अपने स्थान पर नहीं है तो यह मान लिया जाता था कि उसे बाघ ने मार लिया है। तब पर्यटकों को वहां पर निर्मित मचानों में बैठाकर हाथियों द्वारा बोझी में पालतू हाथियों द्वारा हांका लगाया जाता था। हांके से घबड़ा कर जब बाघ मचानों के सामने से गुजरता था तो पर्यटक आसानी से उसे देख लेते थे तथा फोटो खींच लेते थे। हांके में कई बार पांच छः बाघ भी बोझी में देखे जा सकते थे। एक बार तो सात बाघ हांके में दिखाई दिये थे। बार–बार हांका लगाने से बाघों के व्यवहार में परिवर्तन हो गया था। कई बार वे हांके में अपनी जगह से न हटकर बोझी में ही छिप जाते थे या यदि कोई हाथी उनके निकट चला जाए तो गुर्राकर हाथी की ओर दौड़ पड़ते थे।

एक बार जब हांका लगाने के बाद कोई बाघ बाहर नहीं आया तो मैंने यह जानने के लिए कि बाघ मारे गये पड्ढा को पूरा खा चुके हैं या नहीं तो मैं एक हाथी में बैठकर मारे गये पड्ढे की घसीट देखते हुए बोझी के अन्दर बढ़ा। कुछ दूर जाने के बाद जब घनी घास के अन्दर घसीट नहीं दिखाई दी तो मैं हाथी से उतरकर पैदल ही घसीट के निशान ढूंढता हुआ एक बहुत घनी झाड़ी के पास पहुंच गया। हाथी मेरे पीछे पीछे ही आ रहा था। यहां पर मुझे शक हुआ कि इसी घनी झाड़ी में बाघ ने पड्ढे का बचा हुआ भाग छिपाया होगा। मैं फिर हाथी पर बैठा और महावत को बोझी के अन्दर हाथी ले जाने को कहा। इस पर महावत ने हाथी को दो चार कदम ही आगे बढ़ाया था कि वहां मौजूद बाघ गुर्रा कर हाथी की ओर झपटा। यह मेरा सौभाग्य था कि मैं हाथी पर वापिस बैठ गया था वर्ना बाघ मुझे अवश्य मार देता।



एक बार हांका लगाते समय बाघ ने मालनकली हथनी पर झपट कर उसकी सूंड़ को अपने पंजे से जख्मी कर दिया था। इन कारणों से पड्ढा बांध कर हांका लगाने की प्रथा वर्ष 1970 – 71 के आसपास समाप्त कर दी गई।

पर्यटकों को जंगली हाथी दिखाने के लिए दो वन्य जन्तु रक्षक रोज ट्रैकिंग के लिए जाते थे। उनकी सूचना के आधार पर पर्यटकों को हाथियों पर बैठाकर जंगली हाथी दिखाने की व्यवस्था की जाती थी।

पर्यटकों को उन्हीं की गाड़ियों से ढिकाला, बोक्साड़, पटेरपानी, कांड़ा, सर्पदुगी तथा गैरल के आसपास घुमाया जाता था जहां उन्हें चीत्तल, सांभर, पाडा, सुअर आदि पर्याप्त संख्या में दिखाई देते थे। यदा कदा बाघ और गुलदार भी सड़क पर ही दिखाई देते थे।

पार्क में पर्यटकों की कुल संख्या वर्ष 1962–63 में दो हजार के आसपास थी तथा उनसे प्राप्त आय भी बीस हजार के आसपास थी। तब पर्यटकों से निम्न प्रकार शुल्क लिये जाते थे।

प्रवेश शुल्क – एक रूपया प्रति व्यक्ति
छात्रों से आठ आने (पचास पैसे) प्रति छात्र

आवास शुल्क – वन विश्राम भवन तथा अनेक्सी – 30 रू0 प्रति कक्ष प्रतिदिन
स्टूडेन्ट डारमेटरी – पांच रू0 प्रति बेड प्रतिदिन
टेन्ट (swiss cottage) – पांच रू0 प्रतिदिन
हाथी सवारी – पांच रू0 प्रति फेरा (2 घंटे) प्रति व्यक्ति

पार्क में पर्यटकों की संख्या में लगातार हो रही वृद्धि के कारण बाद के वर्षों में ढिकाला खिनानौली, गैरल व बिजरानी में आवासीय भवनों का निर्माण मेरे ही कार्यकाल में किया गया जिसके पश्चात आवासीय व्यवस्था बढ़कर निम्न प्रकार हो गई –

1. ढिकाला – 90 बैड
2. खिनानौली – 6 बैड

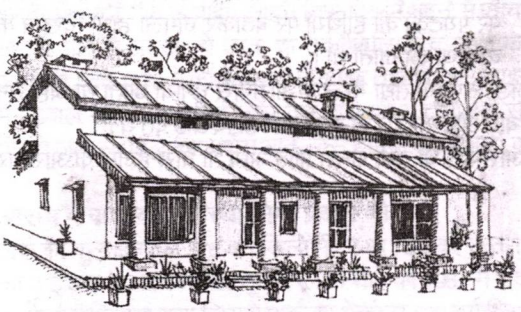
3.	सर्पदुली	–	4 बैड
4.	गैरल विश्राम भवन	–	12 बैड
5.	बिजरानी	–	8 बैड
6.	कांडा	–	4 बैड

इस प्रकार पार्क में एक समय पर 124 पर्यटकों के ठहरने की क्षमता हो गई। पर्यटकों की संख्या में लगातार हो रही वृद्धि के कारण स्टाफ की संख्या बढ़ाई गई तथा सवारी के लिए और हाथी भी खरीदे गये।

देश में बाघों को अतरिक्त संरक्षण देने तथा उनकी संख्या में वृद्धि के लिए वर्ष 1973 में देश के 9 बाघ बाहुल्य क्षेत्रों को 'प्रोजेक्ट टाइगर' के अंतर्गत लाया गया। कार्बेट पार्क उनमें से एक था जिसमें प्रोजेक्ट टाईगर का शुभारम्भ किया गया था। तब समस्त पार्क का प्रबंध निदेशक प्रोजेक्ट टाइगर के सुपुर्द कर दिया गया जिनका मुख्यालय रामनगर है। पार्क की पर्यटन की व्यवस्था भी वर्ष 1979 में डारेक्टर प्रोजेक्ट टाइगर के सुपुर्द हो गई।

आज कार्बेट नेशनल पार्क की ख्याति पूरे विश्व में फैल गई है जिसकी वजह से यहां पर्यटकों की संख्या में अप्रत्याशित वृद्धि हो रही है। यहां का प्राकृतिक सौंदर्य तथा स्वच्छ वातावरण पर्यटकों को बहुत प्रभावित करता है। एक फ्रांसीसी युवती तो ढिकाला में रहकर यहां के सौंदर्य से इतनी प्रभावित हुई थी कि उसने पुराने विश्राम भवन की Visitors Book में जो remarks फ्रेंच भाषा में लिखे थे उनका अंग्रेजी अनुवाद इस प्रकार है। "This is really a Paradise, Is there a bachelor who can marry me here?" इस मुकाम तक पहुंचने में पार्क प्रबंधन को कुछ कठिन समस्याओं का सामना करना पड़ा जिनमें निम्न प्रमुख हैं

नेशनल पार्क के अन्दर पातली दून घाटी में वर्षात के दिनों (जून से सितम्बर) वन विभाग के समस्त कर्मचारी पार्क क्षेत्र से बाहर चिमरारखाल, कालागढ़ या रामनगर चले जाते थे जिससे पूरी पातली दून घाटी में बोक्साड़ से लेकर धनगढ़ी तक कोई भी कर्मचारी नहीं रहता था। ढिकाला जो पर्यटन का केन्द्र बिंदु था वर्षा काल के चार महीनों में मानव विहीन हो जाता था जिससे जंगली हाथी वन विश्राम भवनों तथा स्टाफ क्वार्टरों के खिड़की दरवाजे तोड़ देते थे। इसके अलावा विश्राम भवनों में रखा गया कीमती सामान (क्राकरी, कटलरी, बर्तन व बिस्तर आदि) के चोरी होने का खतरा पैदा हो गया था। ढिकाला में इस तरह का बहुत सामान था जिसे ट्रक में लादकर पार्क बंद होते ही जून में रामनगर लाया जाता था जहां इसके भण्डारण की उपयुक्त व्यवस्था न होने के कारण सामान की टूट फूट व चूहों द्वारा क्षति हो जाती थी। वर्षात के बाद जब अक्टूबर में पार्क का स्टाफ ढिकाला वापस जाता था तो रेस्ट हाउसों के खिड़की दरवाजे क्षतिग्रस्त अवस्था में रहते थे जिनकी मरम्मत में काफी समय तथा धन व्यय हो जाता था। इस समस्या के समाधान के लिए यह अति आवश्यक हो गया था कि ढिकाला में साल के बारहों महीने पार्क के कर्मचारी रहें। वर्ष 1963 में मैंने निश्चय किया कि वर्षा काल में मैं स्वयं ढिकाला में रहूँ। मेरे अधीनस्थ स्टाफ में उस समय आठ वन्य जन्तु रक्षक, तीन चौकीदार तथा एक माली थे। उनसे विचार – विमर्श कर यह तय हुआ कि चार आदमी बारी बारी से पंद्रह दिन ढिकाला में रहेंगे। मलेरिया से बचाव के लिए सब के लिये मच्छरदानियाँ क्रय की गई तथा आवश्यक दवाइयाँ (क्लोरोक्विन, ओड़ोमास आदि) ढिकाला में रखी गईं। राशन तथा आवश्यक खाद्य सामग्री हाथियों द्वारा आवश्यकतानुसार मंगाई जाती थीं। जून से अगस्त तक यह व्यवस्था सुचारू रूप से चली। सितम्बर में मैं कुछ दिन का अवकाश लेकर अपने गांव चला गया। दुर्भाग्यवश मेरे अवकाश के दौरान ही गंगा प्रसाद नामक एक वन्य जन्तु रक्षक को मलेरिया हो गया और इससे पहले कि उसे इलाज के लिए हाथी द्वारा रामनगर भेजने की व्यवस्था की जाए उसने हताशा में शाम चार बजे रेस्ट हाउस के कमरे में सरकारी बन्दूक से आत्महत्या कर ली। इस दर्दनाक सूचना को लेकर दो वाइल्ड लाइफ गार्ड अगले दिन रामनगर पहुँचे जहां से वाइल्ड लाइफ वार्डन घटना के तीसरे दिन ढिकाला पहुंच सके और मृतक के शव को हाथी में लादकर पोस्टमार्टम के पश्चात् दाह संस्कार किया गया।



इस घटना के पश्चात पार्क प्रशासन के विरूद्ध तीव्र प्रतिक्रिया स्वाभाविक थी। स्थानीय समाचार पत्र ने इसे "जंगली आदमियों का जंगली व्यवहार" शीर्षक देकर इसकी भर्त्सना की। इसके फलस्वरूप अगले वर्ष वर्षात में कोई कर्मचारी ढिकाला में नहीं रहा।

इस विषय पर तत्कालीन मुख्य वन्य जन्तु प्रतिपालक श्री डी0 एन0 मिश्रा से विचार विमर्श के बाद यह आवश्यक समझा गया कि ढिकाला में वर्षात में पार्क के कुछ कर्मचारियों का रहना अति आवश्यक है। तत्पश्चात कर्मचारियों को वर्षा काल में ढिकाला में रहने के लिए कुछ विशेष सुविधायें देकर प्रोत्साहित किया गया। इससे साल के बारहों महीने पार्क के कर्मचारी ढिकाला में रहने लगे। अब समूचे पार्क क्षेत्र की हर चौकी पर साल भर पार्क कर्मचारी रहते हैं जिससे पार्क की सुरक्षा व्यवस्था में काफी सुधार हो गया है।

पार्क क्षेत्र में ढिकाला के समीप फुलई तथा लूनिया नामक स्थानों में दो गोठें (Cattle Camp) थे जहां नवंबर से मई तक मंडाल घाटी के कई गांवों के मवेशी चुगान के लिए रहते थे। इन मवेशियों की संख्या प्रति गोठ एक हजार के आसपास होती थी। इन मवैशियों को चरवाहे खुला छोड़ देते थे जिससे ये बार–बार चुगने के लिये ढिकाला चौड़ में आ जाते थे। कई बार उनमें खुरपका आदि बीमारियां हो जाती थीं जिससे पार्क में वन्य जन्तुओं में फैलने का भय बना रहता था। इनके चरवाहों को बार–बार समझाने पर भी जब इनका पार्क में चुगना बन्द नहीं हुआ तो मैंने चरवाहों को बुलाकर उन्हें अंतिम चेतावनी दी कि यदि भविष्य में उनके मवेशी पार्क क्षेत्र में चुगने आये तो उन्हें रामनगर खोड़ (Cattle pond) भेज दिया जायेगा। इस चेतावनी का भी जब कोई असर नहीं हुआ तो एक दिन सुबह ही जब कुछ पर्यटक ढिकाला में रूके थे तो इन मवेशियों का एक बड़ा झुंड जिसमें लगभग पांच छ सौ गाय व बछड़े थे ढिकाला चौड़ में वन विश्राम भवन के निकट ही चुगते दिखाई दिये। इनके साथ कोई चरवाहा नहीं था। अतः मैंने चार वन्य जन्तु रक्षकों को इन्हें हांककर रामनगर खोड में ले जाने का आदेश दे दिया। रामनगर ले जाते समय इनमें से अधिकांश मवैशी रास्ते से भटक कर जंगल में चले गये। फिर भी एक सौ बारह मवैशी अगले दिन रामनगर खोड़ में पहुंचाये गये। मेरी इस कार्रवाही का ग्रामीणों ने तीव्र विरोध किया। किन्तु इस सख्ती का असर हुआ और फिर पार्क में मवेशियों का चुगना बन्द हो गया। वर्ष 1967 में पार्क क्षेत्र का विस्तार होने से ये गोठें सदा के लिए बन्द हो गई।

कालागढ़ पन बिजली प्रोजेक्ट का कार्य वर्ष 1962 में आरम्भ हो गया था। इस परियोजना में हजारों आदमी काम करते थे जिससे कालागढ़ से ढिकाला तक पूरी रामगंगा घाटी में बांध में कार्यरत श्रमिकों तथा सिंचाई विभाग के अधिकारियों की आवाजाही से वन्य जन्तुओं की सुरक्षा को खतरा उत्पन्न हो गया था। बांध का निर्माण कार्य वर्ष 1974 में पूरा हुआ। तब तक पार्क की सुरक्षा व्यवस्था बनाये रखना पार्क के तथा टेरिटोरियल स्टाफ के लिए समस्या बनी रही। इसी बीच बांध के डूब क्षेत्र में आने वाले क्षेत्र में पेड़ों के कटान तथा ढुलान पर भी सैकड़ों आदमियों की मौजूदगी से पार्क में व्यवस्था बनाये रखना और भी कठिन हो गया था। पार्क के कर्मचारियों तथा रेंजों के स्टाफ की कठिन मेहनत व सतर्कता के कारण दो चार मछलियों के अवैध शिकार की घटनाओं के अलावा कोई बड़ी घटना नहीं घटी।

वर्ष 1974 की वर्षांत में ढिकाला तक बांध का पानी आने से रामगंगा घाटी का एक बड़ा भू भाग (लगभग 80 वर्ग कि0 मी0) जल मग्न हो गया। यह भू भाग जंगली हाथियों, पाड़ों (Hog deer) तथा चीतलों का बहुत अच्छा चारागह था। इसके पानी में डूबने से हाथियों के आने जाने के रास्ते बंद हो गए जिससे पहले के एक दो वर्षों तक हाथियों का आवागमन बाधित हो गया। धीरे धीरे उन्होंने आवागमन के नये रास्ते तलाश कर लिए। रामगंगा नदी में बोक्साड़ से नीचे की ओर दुधवा वन रक्षक चौकी के निकट एक गहरा तालाब था जिसे सागरा ताल के नाम से जाना जाता था। इस ताल में हर साल मकर संक्रान्ति (14 जनवरी) के दिन मंडाल घाटी के गांवों से बड़ी संख्या में लोग आकर पवित्र स्नान करते थे। यह लोग 13 जनवरी को अपने गांवों से पैदल चलकर पांड के रास्ते ढिकाला पहुंच कर रात्रि विश्राम कर अगले रोज प्रातः वहां से पैदल चलकर सागरा ताल में स्नान कर शाम को अपने अपने गांवों को वापिस चले जाते थे। ढिकाला में उनके रहने की व्यवस्था मंडाल घाटी निवासी ढिकाला में रहने वाले वन कर्मचारी करते थे। ये लोग ढिकाला में जागर लगाकर (ढोलक, कांसे की थाली बजाते हुए गढ़वाली वीर गाथाओं के गीत) नृत्य करते थे। बांध बनने से यह पवित्र ताल डूब गया तथा कालागढ़ से कांडा तक का रास्ता भी डूब गया। इस रास्ते से मंडाल घाटी के लोग कालागढ़ बाजार से नमक, गुड़, कपड़ा तथा अन्य आवश्यक सामान खरीदकर ले जाते थे।

सागरा ताल में ग्रामीणों के स्नान से सम्बन्धित एक रोचक घटना का यहां पर उल्लेख कर रहा हूँ। हर साल की तरह एक बार 13 तारीख जनवरी की शाम मंडाल घाटी के बीस पच्चीस स्त्री पुरूषों की एक टोली सागरा ताल में पवित्र स्नान करने हेतु ढिकाला पहुंचा। अपने परिचित जिस वन कर्मचारी के यहां उनका रात्रि विश्राम का इरादा था वह चुनाव ड्यूटी में ढिकाला से बाहर गया था। आगुंतक व्यक्तियों में से कुछ मुझसे परिचित थे इसलिए उन्होंने रात में ठहरने व जागरण के लिए मुझसे अपने आवास में कमरा उपलब्ध करने का आग्रह किया। मेरे आवास में पर्याप्त जगह थी क्योंकि मैं उसमें अकेला ही रहता था। अतः मैंने एक बड़े कमरे में दरी बिछाकर तथा अंगीठी में आग जलाकर उनके ठहरने की व्यवस्था कर दी।

जागर शुरू होने ही वाला था कि फ्रांस के एक नवविवाहित पर्यटक जोड़ा मुझसे मिलने मेरे आवास पर आया। मैंने उनसे कहा कि मेरे आवास पर एक सांस्कृतिक कार्यक्रम शुरू होने जा रहा है। यदि वे इच्छुक हों तो देख सकते हैं। उन्होंने, देखने की इच्छा प्रकट की तो मैंने अपनी बगल में उनके बैठने का प्रबन्ध कर दिया। कुछ ही देर में जागर लगनी शुरू हो गई। ढोलक व कांसे की थाली की थाप पर पहले पुरूषों का नाच हुआ। उसके बाद महिलाओं की बारी थी। जागर के गीतों के साथ नाचने गाने के लिए उत्तेजित करने के लिए एक करछी में आग रखकर उसमें घी डालकर धुआं सुंघाया जाता है। माना जाता है कि इससे देवी प्रकट हो जाती है। इस प्रक्रिया में धूप सूंघते ही सब महिलाओं पर देवी प्रकट हो गई और वे मस्त होकर नाचने लगी। मेरी बगल में बैठी फ्रेंच युवती को भी जब धूप सुंघाई गई तो उस पर भी अन्य महिलाओं की तरह देवी प्रकट हो गई और वह महिलाओं के बीच नाचने को कूद पड़ी। उसका पति "NO–NO" कहता उसे पकड़ने लगा पर वह नहीं मानी। अगले दिन उस जोड़े ने मुझे इस उत्सव में आमंत्रित करने के लिए बहुत धन्यवाद दिया और कहा कि उन्हें इसमें बड़ा आनन्द आया।

कार्बेट पार्क के अंदर कुछ गांव थे जिनका विस्थापन होना गांव वालों और पार्क दोनों के हित में आवश्यक था। इनमें से तीन गांव धारा, झरना तथा कोठीराव जो पार्क की दक्षिणी सीमा के पास स्थित थे उनका विस्थापन सोलह वर्ष पूर्व तत्कालीन पार्क निदेशक श्री आनन्द सिंह नेगी के अथक प्रयासों से हो चुका है। तथा एक और गांव लालढांग का भी आंशिक रूप से विस्थापन हो चुका है। लेकिन पार्क की उत्तरी

सीमा पर स्थित पांड व तैड़िया गांवों का विस्थापन अभी होना बाकी है। यद्यपि इन गांवों के लोगों से पार्क के संरक्षण में सहयोग मिलता रहा है किन्तु अब वन्य जीव तस्करों की बढ़ती गतिविधियों के कारण ये गांव वन्य जीव तस्करों की शरणास्थली बन सकते हैं और गांववासियों को रूपयों का लालच देकर पार्क में वन्य जीवों का ट्रैपिग या शिकार कर सकते हैं। मैं आशा करता हूँ कि पार्क प्रशासन इस गंभीर विषय पर अपना ध्यान देगा।

कालागढ़ में बांध निर्माण में कार्यरत अधिकारियों तथा कर्मचारियों को आवासीय कालोनी तथा कार्यालयों के लिए नेशनल पार्क की जमीन इस शर्त के साथ वन विभाग ने दी थी कि बांध का निर्माण कार्य समाप्त होने के पश्चात् यह जमीन सिंचाई विभाग उ0प्र0 खाली कर वापिस वन विभाग को सुपर्द कर देगा। बांध का काम पूरा हुए अब 36 – 37 वर्ष बीत चुके हैं किन्तु अभी तक इस जमीन के अधिकांश भाग पर सिंचाई विभाग का कब्जा है। जो जमीन सिंचाई विभाग के कब्जे में नहीं है उस पर आसामाजिक तत्वों का कब्जा है। इससे पार्क की सुरक्षा व्यवस्था खतरे में है। मैं आशा करता हूँ कि वन विभाग के अधिकारी इस ओर ध्यान देकर अनधिकृत कब्जे हटाकर भूमि को अपने कब्जे में लेंगे। आशा है कि निदेशक कार्बेट टाइगर रिजर्व इस विषय पर गंभीरता से विचार कर शीघ्र कार्यवाही करेंगे।

मुझे खुशी है कि इस वर्ष कार्बेट नेशनल पार्क की स्थापना के 75 वर्ष पूरा होने पर प्लेटिनम जुबली मनाई जा रही है। इस अवसर पर पार्क प्रशासन को तथा उसमें कार्यरत सभी अधिकारियों व कर्मचारियों को हार्दिक बधाई देता हूँ। मैं उन अधिकारियों व कर्मचारियों को भी बधाई देता हूँ जो इस पार्क को अपनी सेवायें देने के पश्चात् सेवा निवृत्त हो चुके हैं। पार्क की परिधि में आने वाले सभी ग्रामवासी भी बधाई के पात्र हैं क्योंकि उन्होंने भी पार्क की सुरक्षा में अपना योगदान दिया है।

सेवा निवृत्ति के पश्चात मैं "आपरेशन आई आफ द टाईगर – इंण्डिया" नामक गैर सरकारी संस्था में काम कर रहा हूँ। यह संस्था बाघ संरक्षण के लिए पार्क के निकटवर्ती गांवों तथा विद्यालयों में प्रचार प्रसार कर जन साधारण को बाघ तथा उसके आवास स्थलों की सुरक्षा में अपना योगदान देने के लिए प्रेरित करती है। संस्था द्वारा पार्क की परिधि के निकट कई विद्यालय में 'बाघ मित्र' क्लबों की स्थापना की है। आशा की जाती है कि ये लोग आने वाले समय में बाघ संरक्षण में अपना योगदान देते रहेंगे।

मुझे विदित हुआ कि देश में जितने टाइगर रिजर्व है उनमें से बाघों की संख्या का घनत्व (population density) कार्बेट टाइगर रिजर्व में सर्वाधिक है। यह प्रदेश के लिए गौरव की बात है। किन्तु हमें इससे संतुष्ट न होकर संरक्षण के लिए प्रयास जारी रखने चाहिए। किसी भी वन क्षेत्र में बाघों या अन्य वन्य जीवों की संख्या क्षेत्र की गुणवत्ता पर निर्भर रहती है और यह संख्या किसी सीमा तक ही बढाई जा सकती है। पार्क क्षेत्र को संरक्षण देने के साथ–साथ उससे मिले हुए वन क्षेत्रों में भी पर्याप्त संरक्षण मिलना चाहिए। इसके साथ ही पार्क की परिधि में बफर जोन का विस्तार होना चाहिए। मेरा सुझाव है कि पार्क से मिला हुआ रामनगर वन प्रभाग कम से कम पावलगढ़ (बाबर नदी) तथा लैन्सडाउन डिविजन का कोठरी रेंज वफर जोन में शामिल किए जाने चाहिए।

वर्तमान में पार्क के दक्षिणी क्षेत्र में बिजरानी ढेला तथा झिरना में पर्यटकों की निरंतर बढ़ती संख्या के कारण इन क्षेत्रों में मानव दखल बहुत बढ़ रहा है। रामनगर से कुमरिया तक टूरिस्ट रिजार्टों की संख्या बढ़ती ही जा रही है इससे भविष्य में पार्क क्षेत्र में ज्यादा आवाजाही बढ़ने से वन्य जीवों के हितों पर विपरीत असर पढ़ेगा। रामनगर डिवीजन के इस क्षेत्र को बफर जोन में शामिल कर भंडारपानी, सीतावनी, पावलगढ़ व कालाढूंगी क्षेत्रों को पर्यटन के लिए विकसित किया जा सकता है। इससे बिजरानी, ढेला तथा झिरना में पर्यटकों का दबाव कम हो जायेगा। इसी प्रकार पार्क के पश्चिम में भी बफर जोन का विस्तार कर कोलूचौड़, चौखम्भा, नौड़ी तथा स्नेह के क्षेत्रों को इसमें शामिल किया जाए तो पर्यटकों का दबाव ढिकाला व बिजरानी क्षेत्रों पर घटाया जा सकता है।

वर्तमान में पार्क की परिधि में सभी वन क्षेत्रों में वन गुजरों द्वारा पेड़ों की लौपिंग कर भारी क्षति पहुंचाई जा रही है जिससे जंगली हाथियों को चारे की कमी के कारण वन क्षेत्र से बाहर कृषि क्षेत्र में खाने की तलाश में आना पड़ रहा है। इससे उनका मनुष्यों से टकराव (Man animal Conflicts) की घटनायें बढ़ रही हैं। मेरा वन विभाग के अधिकारियों से निवेदन है कि वे इस विषय पर गंभीरता से विचार कर नई वृक्षारोपण नीति बनाकर अधिकाधिक चारा प्रजाति के पौधे वृक्षारोपण क्षेत्रों में रोपित करें।

Swallow feeding the chicks
Photo : Bhagat Singh

CORBETT NATIONAL PARK THE NATIONAL HERITAGE

***Bhagat Singh**

Corbett National Park was established in 1936, as the first National Park of India, with an area of 521 sq. Kms. In the year 1973, when the project Tiger Scheme was launched on the recommendations of the Wildlife Board of India, Corbett Park had a rare privilege of being declared as the first Tiger Reserve in India. Later, Sonanadi Wildlife Sanctuary, adjoining the park on the west, with an area of 301 sq. Kms., and the surrounding Reserve Forest of 495 sq. Kms., forming the buffer zone, were brought under the ambit of the Corbett Tiger Reserve; thus increasing its area to 1317 sq. Kms., spread over an elevation of 400 m. to 1200 m.

Nestled in the midst of Uttaranchal Foothills, it preserves rich wealth of flora and fauna that attracts visitors from all over the world. The serene, sublime and awe-inspiring forest of this region are one of the nature's most beautiful gifts to mankind, and offer the most fascinating wonder – rich in natural splendor, scenic charm and virgin wilderness. The "Wild Calls" of this enchanting land never cease to stimulate, rejuvenate and refresh the nature lovers. Even in chilly winters, this forest region remains as mysterious and magnificent as during the wondrous spring, when trees are bedecked with blooms and wild flowers embellishing the undulating slopes.

One may travel in any part of it, the collage of natural splendor and celestial flavor will greet him against the backdrop of vast forested hills. What one finds common all over is the breath-taking panorama of misty mountains and chirpy grass lands – an unmatched vista that comes alive especially at dawn and dusk. No where in India, one would encounter a perfect adventure holiday as here.

Visits to this "Wildlife Paradise" – as it is called, are always exciting, memorable and fascinating. The bio – geographic diversity of this forest country is so vast, so wide and so rich, that it provides most suitable and favorable natural habitat to a great variety of animals, birds and reptiles, including those species that are on the verge of extinction from our global landscape.

The Park preserves 50 species of mammals, 600 species of birds and 26 species of reptiles. The flora include 110 species of trees, 50 species of shrubs, 27 species of climbers, and 37 species of grasses and bamboos.

The Park has its unique distinctive characteristics, with a wide spectrum of biodiversity – the majestic Sal forest, hills clothed with mixed vegetation right up to their crest and rising ridges upon ridges until merging into the blues of the sky, vast stretches of grasslands interspersed with clusters of trees and shrubby patches, wide open glades with luxuriant growth of lush green grass, trees and scrub jungle dotted with patches of light green foliage, sparkling water channels and spring winding through velvet green meadows, narrow ravines running deep into hills, deep gorges, glistering pastures, chirpy forests, and picturesque water falls lend unique grandeur and splendor to the serene wilderness of this

* 24B, C – 4D Janakpuri, New Delhi

forest country, where visitors could watch, with immense interest and pleasure, multitudes of magnificent denizens in the Nature's vast amphitheatre.

The Park affords excellent opportunities for common visitors to breathe fresh air; to seek peace and tranquility; to break the dull and drab monotony of the city life; to relax in natural setting, free from tension and pollution; and to soothe their depressed feelings in an environment, throbbing with the fragrance of wild flowers, with the melodious songs of a great variety of birds, with the playful acts of a large number of animals; with the exhilarating dances of lofty trees, with the glimmer of trickling water springs, and the enchanting tunes played by the swirling waters of Ramganga descending down the forested hills.

ANIMAL LIFE:

For wild life enthusiasts the Park offers serene wilderness in abundance to explore the rich heritage of flora and fauna the nature has preserved for ages. One could undertake field excursions to appease the infinite urge that glows ceaselessly within one's heart to acquire more and more knowledge from the Nature's vast storehouse, which has no beginning and to which there is no end. One may derive unending pleasure from watching two Cheetal stags engaged in a fierce fight to establish their supremacy over the heard they are tending; of a baby elephant, with his trunk stretched out, chasing a small bird perched on a leaf or on a blade of grass; or a young deer fawn bounding away at top speed with the whole herd of his kind trailing behind; or a grown – up baby elephant standing on the sandy bank of Ramganga river and deliberately kicking sand under his feet on to a young Sambhar hind in mid-stream intending to cross the river; or a big sambhar stag, with large antlers, walking quietly in a scrub jungle, and on sensing danger from any quarter, stopping suddenly, and, holding his head high over the shoulders, looking around to assure himself that no danger follows him from behind; or a new born Cheetal fawn walking beside his mother on his tender legs with labored efforts; or a solitary kakad (barking deer) standing on his toes ready to dash away into the nearby bushes at the slightest indication of danger; or a large herd of Cheetal (spotted deer) on an open patch of grass, with young ones, all about the same age, racing in a single file across a glade laid with velvet green grass, while the grown-up hinds and stags either lying down or feeding on the short grass; or a giant tusker splashing water over his body; or a crocodile or an alligator basking either on a rock jutted out of the water or on the sandy beach of the river; or a monitor lizard lying still on a strip of outstretched grass with open eyes, ready to rush into the bushes at the slightest disturbance; or elephant, in large numbers, varying in size and age, bathing in the river some looking like huge black rocks submerged in water, some crossing the river with their crowns and trunk folded down into their mouths, and the young ones playing about merrily in water; or a couple of jackals strolling quietly along an animal track in search of food; or a family of wild pigs – one sturdy male with short protruded tusks, one grown-up female with two or more young ones-industrially digging out roots of plants; or a large python lying coiled on a soft bed of grass; or a big snake creeping into a hole; or a leopard crouching under dense thickets ready to launch his spring on the Cheetal cropping the short grass in a glade; or a Ghoral standing close to the edge of a steep rocky cliff high up on the hills; or a troupe of Langoors hurriedly climbing up higher and higher on trees; or a tiger lying on the wet ground close to a stream or

forest country, where visitors could watch, with immense interest and pleasure, multitudes of magnificent denizens in the Nature's vast amphitheatre.

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in a water pool or under the canopy of dense leafy trees during the long hours of the summer months; and hosts of other exciting acts that are performed by a large number of animals in the Nature's vast theatre with perfect exactitude.

BIRD LIFE:

The vast water reservoir formed by construction of a dam across Ramganga at kalagarh provides shelter to many species of birds that migrate from distant places in central Asia, Europe and China to the Indian Sub-continent in winter. The spectacular flocks of wintering water – birds are one of the special attractions.

The Park is stocked with ample opportunities of Bird – lovers to derive unending pleasure, while watching a mixed flock of known and unknown birds flying past the open sky; or a baya bird building its nest or seen with a long thread, torn off a leaf or a blade of grass,, trailing behind in flight; or a flock of thrushes, robins, bulbuls and Shamas pouring out melodious songs to welcome the new-born dawn; or a group of mynas and babblers warning the jungle folk of the approaching danger; or a solitary peacock emitting its piercing call to attract hens; or a lone jungle – fowl turning the dead leaves in search of food; or flocks of green pigeons, barbets and parakeets, and a host of other fruit – eating birds gliding from tree to tree; or bee eaters, fly catchers and Drongos perched on leafless twigs and darting into the air to feed on bees and winged insects; or large birds like fishing eagles and owls perched on leafless branches of trees standing close to Ramganga, ready to pounce upon fish the moment the latter would appear on the surface of the water; or kingfishers, with strong and stout bills, hovering over water pools, looking straight down below, to steep drop and dive into the water to catch fish; or birds of prey circling overhead looking for the victim on the ground below; or gaily colored tiny sunbirds sucking nectar from flowers; or large flocks or migratory birds (winter visitors) like ducks, geese, cormorants etc., landing in Ramganga to rest and feed on way to distant places in the Indian sub-continent, and numerous such other acts, full of excitement, thrill and suspense, performed by a large multitude of birds in the Nature's garden.

FLORA:

The forest-clad hills of the Park have a mixed growth of trees. The prominent among them are: Sal *(Shorea robusta),* Haldu *(Adina cordifolia),* Shisham (*Dalbergia sissoo*), Khair (*Acacia catechu*), Chir (*Pinus roxbirghii*), Bakli (*Anogeissus latifolia*), Amaltas (*Cassia fistula*), Amla (*Embica officinalis*), Ber (*Zizyphus mauritiana*), Mahuwa (*Madhuca Latifolia*), Jamun (*Syzigion cumini*), Bahera (*Terminalia alata*), Rohini (*Mallotus phillippensis*), Pipal (*Ficus religiosa*), Bargad (*Ficus benhgalanses*), Pakhar (*Ficus rumphii*).

Corbett National Park is, thus, fully stocked with wild animals and birds, and invites all nature lovers and wildlife enthusiasts to follow their invigorating pursuits, and to explore the rich treasures of wildlife of the Uttarakhand Foothills. The Park provides a lot of opportunities to the visitors to explore the fascinating world of wildlife. It would not only stimulate interest but would also guide those who are still on threshold of venturing into the vast amphitheatre of Nature.

कार्बेट राष्ट्रीय उद्यान की जीवन रेखा- रामगंगा

*आनन्द सिंह नेगी

जंगल नदी की मां है। जंगलों से ही नदियों में पानी की निरंतरता बनी रहती है। रामगंगा भी एक ऐसी ही नदी है जो बर्फ से नहीं बल्कि जंगलों से पोषित है। हिमालय क्षेत्र की अधिकांश नदियां बर्फ से पोषित हैं। परन्तु रामगंगा जिसका उद्गम चमोली जनपद में गैरसैण से है, जंगलों से पोषित है। पौराणिक कथाओं में पवित्र गंगा के भगीरथ की कठिन तपस्या के फलस्वरूप निकलने व शिवजी द्वारा उसे अपनी जटा में रोकने का वर्णन है। मेरे विचार से शिवजी की जटा उस समय के बृहद व घने जंगलों में मौजूद पेड़ों की जडें रही होंगी, क्योंकि उन्हीं में हिमालय से निकली गंगा के जल को अपने में समेट कर रोकने की शक्ति हो सकती है। बांज के वृक्षों में पानी को रोकने की अपूर्व क्षमता है। रामगंगा का नाम क्यों और कैसे पड़ा इसका कोई विवरण उपलब्ध नहीं है परन्तु नदियों का नाम देवी देवताओं से जोड़ना हिन्दु धर्म में कोई नई बात नहीं है। कई लोगों को यह भ्रम हो जाता है कि रामनगर रामगंगा के किनारे बसा होगा परन्तु यह वास्तव में रामगंगा के जल समेट क्षेत्र में भी नहीं है बल्कि कोसी के किनारे बसा है। रामगंगा कार्बेट टाइगर रिजर्व की महत्वपूर्ण नदी है तथा कार्बेट राष्ट्रीय उद्यान का नाम आजादी के बाद रामगंगा राष्ट्रीय उद्यान रखा गया था। जिम कार्बेट की मृत्यु के बाद उन्हें सम्मानित करने के लिये यह नाम बदल कर कार्बेट राष्ट्रीय उद्यान रखा गया। रामगंगा नदी कार्बेट राष्ट्रीय उद्यान के मध्य से बहती है। सोनानदी अभयारण्य तथा कालागढ़ वन प्रभाग के अधिकांश शेष भाग से रामगंगा की महत्वपूर्ण जल धारायें आती हैं। कार्बेट राष्ट्रीय उद्यान तथा सोनानदी अभयारण्य के विविध प्रकार के वन्य जीवों के लिय रामगंगा का अत्यधिक महत्व है। राम गंगा को कार्बेट राष्ट्रीय उद्यान की जीवनधारा कहना अतिशयोक्ति न होगा।

रामगंगा नदी उत्तराखण्ड के चमोली जनपद में वाह्य हिमालय से निकलर हिमालय पर्वत श्रृंखला में 125 कि0मी0 की टेढ़ी मेढ़ी यात्रा करने के बाद कालागढ़ नामक स्थान पर एक ऊँचे बांध द्वारा रोक दी गई है। यहां से आगे रामगंगा मैदानी क्षेत्र में बहती है। बांध बनने से पूर्व अपनी मैदानी क्षेत्र की यात्रा के दौरान रामगंगा का बहाव मार्ग पूर्णतः अनिश्चित था और नदी हर वर्ष अपना मार्ग परिवर्तित करती थी। उन्नीसवीं सदी के मध्य में रामगंगा ने अपना बहाव बदलकर बरेली शहर से गुजरी थी। सन् 1871 में यह पुनः अपने पूर्व मार्ग पर चली गई थी जो 16 कि0मी0 दूर रह गया था। रामगंगा के पानी की मात्रा जहां वर्षकाल में 10,000 क्यूसेक तक पहुंच सकती है वहीं भीषण गर्मी में यह मात्र 5 क्यूसेक रह जाती है।

रामगंगा का जल समेट क्षेत्र अल्मोड़ा, चमोली, गढ़वाल तथा नैनीताल जनपदों में फैला हुआ है। रामंगगा के जल समेट क्षेत्र का कुल क्षेत्रफल 3,10,725 हैक्टेयर है। कुल जल समेट क्षेत्रफल के 45 प्रतिशत क्षेत्र में आरक्षित व सिविल/सोयम वन है। 22 प्रतिशत क्षेत्र में खेती होती है तथा शेष चारागाह, परतीभूमि तथा फलोद्यान आदि के अन्तर्गत है। जल समेट क्षेत्र की समुद्र सतह से ऊँचाई 270 मीटर से 3100 मीटर तक है तथा औसत वार्षिक वर्षा 150 सेमी0 के लगभग है। जल समेट क्षेत्र का कुछ भाग शिवालिक पर्वत श्रृंखला में भी पड़ता है। खेती समुद्र सतह से 1057 मीटर तथा 1859 मीटर के मध्य की जाती है।

रामगंगा की मुख्य सहायक धारायें गगास नदी तथा विनो नदी अल्मोड़ा जनपद में तथा मंदाल, हल्दगाड़ तथा सोनानदी गढ़वाल जनपद में पड़ती है। गैरसैंण से मेहलचौरी के पास तक अपर रामगंगा चमोली जनपद में पड़ती है। रामगंगा मरचूला के पास कार्बेट टाइगर रिजर्व में प्रवेश करती है। मढ़चूला से दोमुण्डा तक लगभग 10 कि0मी0 की दूरी तय करने के बाद यह कार्बेट राष्ट्रीय उद्यान में प्रवेश करती है। गैरल तक लगभग 4 कि0मी0 नदी की दाई ओर कार्बेट राष्ट्रीय उद्यान तथा बाई और कालागढ़ बफर प्रभाग पड़ता है। गैरल से आगे नदी के दोनों ओर कार्बेट राष्ट्रीय उद्यान है और कालागढ़ तक लगभग 25 कि0मी0 लम्बई में यह पार्क के अन्दर से गुजरती है। गौजेड़ा नाला से आगे एक ओर पार्क व एक ओर सोनानदी सेन्चुरी है। गैरल से आगे नदी का पाट काफी चौड़ा हो जाता है और रामगंगा जलाशय में मिलने से पूर्व यह अनेक धाराओं में बंट जाती है जो हर वर्ष अपना मार्ग बदलती रहती है। इन जल धाराओं के मध्य खैर, शीशम के जंगल पैदा हो जाते हैं जिन्हें मंझाड़े कहा जाता है। कहीं कहीं पर यह मंझाडे काफी चौड़े हो जाते हैं जिनमें नरकुल घास, लैण्टाना, भांग तथा अन्य घासें उग आती है और मंझाड़े अत्यधिक घने होने के कारण शेर के छिपने के लिये उपयुक्त स्थान बन जाते हैं । गर्मियों में सर्वत्र पानी की कमी होने से जंगली हाथी भी काफी समय इन मंगाड़ों में बिताते हैं। वर्षा ऋतु के बाद हर वर्ष इन मंझाड़ें का आकार बदलता रहता है और कभी कभी अत्यधिक बाढ आने की दशा में अधिकांश मझाड़े समाप्त भी हो जाते हैं जो धीरे–धीरे फिर बन जाते हैं। इन मझाड़ों में पाड़े, चीतल, सांभर व काकड़ भी बहुतायत में रहते हैं। खिनानौली के आगे नदी के दोनों ओर पातलीदून घाटी के चौडे घास के मैदान हैं। ढिकाला इन्हीं घास के मैदानों के बीच में स्थित है। बरसात में जलाशय का पानी बढ़ने पर घास के मैदान घट जाते हैं परन्तु जैसे जैसे जलाशय का पानी कम होता जाता है डूब क्षेत्र से निकली जमीन में दूब व अन्य प्रकार की स्वादिष्ट व पौष्टिक घासों की प्रजातियाँ शीघ्र उग जाती हैं जिनमें चीतलों के बड़े–बड़े झुंड एकत्र हो जाते हैं। यहां तक कि जंगली हाथियों के झुंड भी रात भर इन मैदानो में चरते रहते हैं। जलाशय बनने के बाद पातलीदून घाटी के घास के मैदानों का क्षेत्रफल काफी घट गया है। पार्क तथा अभयारण्य क्षेत्र का 80 वर्ग कि0मी0 क्षेत्र डूब क्षेत्र में आ गया है, जिसमें से अधिकांश भाग घास के मैदान होते थे। जंगली जानवरों का सर्वाधिक धनत्व रामगंगा के किनारे के घास के मैदानों तथा मझाड़ों में पाया जाता है और सबसे

300, मॉडल कालोनी,आराघर,देहरादून *Email- asnegi1943@gmail.com*

कार्बेट पार्क में रामगंगाा का विहंगम दृष्य
फोटो – साभार कार्बेट टाइगर रिजर्व

अधिक जैव विविधता भी इन्हीं क्षेत्रों में पाई जाती है इसीलिये समस्त पर्यटक सुविधाएँ भी इन्हीं स्थानों पर बनाई गई हैं।

रामगंगा नदी माहशीर मछलियों के लिये जग प्रसिद्ध है तथा शौकीन मछली शिकारियों को आकर्षित करती थी। वर्श 1987 तक कार्बेट पार्क में विश्वभर से शौकीन मछली शिकारी आकर इसका आनन्द लेते थे परन्तु अब पार्क व अभयारण्य के अन्तर्गत मछली का शिकार करना निषिद्ध कर दिया गया है। पार्क व अभयारण्य से बाहर अनुमति लेकर फिशिंग रॉड से मछली का शिकार किया जा सकता है। माहशीर मछली अण्डे देने के लिये मन्दाल, पलेन व सोनानदी में वर्षा ऋतु में दूर दूर तक जाती है जहां इसका संरक्षण करना आवश्यक है। रामगंगा नदी में विशेषकर पार्क व अभयारण्य क्षेत्र में गहरे तालाबों में मगर व घड़ियाल पाए जाते हैं। रामगंगा जलाशय बनने के बाद इनकी संख्या में भारी वृद्धि हुई है। इसके अलावा उदबिलाव भी बड़ी संख्या में पाए जाते हैं जो रामगंगा की सहायक नदियों में भी मिलते हैं। मछलियों पर निर्भर मांसाहारी पक्षियों की भी अनेक प्रजातियाँ पाई जाती हैं। महासीर मछली के अलावा गूंच, रोहू ट्राउट आदि मछलियाँ भी पाई जाती हैं।

रामगंगा नदी पर कालागढ़ नामक स्थान पर एक बड़ा बांध निर्मित किया गया है। इस बांध का निर्माण वर्ष 1964 में आरम्भ होकर 1978 में पूर्ण हुआ जिस पर 70.82 करोड़ रूपए की लागत आई। इस बांध में वर्ष 1974 में पानी एकत्र करना आरम्भ हुआ। बांध की कुल क्षमता 244.98 करोड़ घनमीटर पानी एकत्र करने की है, जो 365 मीटर समुद्र तल से ऊँचाई तक पानी जमा करने के लिये बनाया गया है। इस बांध से 5 लाख हैक्टेयर कृषि खेती की सिंचाई होती है तथा 3 X 66 मैगावाट बिजली उत्पन्न करने की क्षमता है। इस बांध का निर्माण उस समय हुआ जब जंगलों व पर्यावरण के प्रति जागरूकता बहुत कम थी। वन विभाग की सहमति लेने की तब आवश्यकता नहीं थी। इस बांध से भारत के प्रथम राष्ट्रीय उद्यान की जंगली जीव जन्तुओं व पेड़ पौधों के सर्वश्रेष्ठ वास स्थल की 80 वर्ग कि0मी0 भूमि जलमग्न हो गई तथा सोना नदी अभयारण्य से जंगली हाथियों के कार्बेट पार्क में आने जाने के परम्परागत मार्ग अवरूद्ध हो गये। इसमें सोनानदी अभयारण्य की 40 वर्ग कि0मी0 श्रेष्ठ जैव विविधता वाली वन भूमि भी जलमग्न हो गई। इस प्रकार 80 वर्ग कि0मी0 श्रेष्ठतम वन क्षेत्र जलाशय में बदल गया साथ ही कालागढ़ में पार्क की सीमा के अन्दर एक ऐसा कस्बा बस गया है, जो कार्बेट पार्क के लिये हमेशा–हमेशा के लिये दुखदाई रहेगा। जलाशय बनने के बाद पाड़ों (हॉग डीयर) की संख्या में भारी गिरावट आई है तथा चीतल भी छोटे समूहों में बंटकर तितर बितर हो गए हैं। जलाशय से जो थोड़ा बहुत लाभ हुआ है उसका जिक्र करना भी आवश्यक है। मगर व घड़ियालों की संख्या में भारी वृद्धि हुई है। माहशीर तथा गूँच मछली की संख्या व आकार में वृद्धि हुई है। अनेक प्रकार के कछुए उत्पन्न हो गए हैं। कुछ प्रवासी पक्षी भी आने लगे हैं। पानी की उपलब्धता बढ़ी है तथा जिस क्षेत्र से पानी उतरता है (draw down area) उनमें भीषण गर्मी के समय हरी पौष्टिक घासें उगती हैं जो हिरनों व जंगली हाथियों के लिये उपयोगी है। जंगली हाथियों के बड़े–बड़े झुंड इन क्षेत्रों में गर्मियों में ठहरने लगे हैं।

रामंगगा के कुल जलसमेट क्षेत्र 310725 हैक्टेयर में से 45 प्रतिशत में आरक्षित तथा सिविल सोयम वन है। इस प्रकार जल समेट क्षेत्र में कुल 139826 है0 वन क्षेत्र है इसमें से आधा से अधिक अर्थात् लगभग 80,000 है0 क्षेत्र कार्बेट टाइगर रिजर्व के अन्तर्गत है जिसमें अत्यन्त घने वन हैं। सम्पूर्ण सोनानदी अभयारण जिसका क्षेत्रफल 31000 है0 है तथा कार्बेट राष्ट्रीय उद्यान का लगभग 30,000 है0 क्षेत्र इसमें सम्मिलित है। यह क्षेत्र जल संरक्षण की दृष्टि से अत्यन्त महत्वपूर्ण है। मन्दाल, प्लेन, हल्दगड़डी तथा सोनानदी में वर्ष भर पानी रहता है। कार्बेट टाइगर रिजर्व से बाहर जो वन हैं वे निम्नकोटि के कम घनत्व वाले वन हैं। अतः रामगंगा के पानी को भीषण गर्मियों में बनाए रखने में टाइगर रिजर्व का महत्वपूर्ण योगदान है। रामगंगा जलाशय की उपयोगिता को अधिक समय तक बनाए रखने के लिये भी टाइगर रिजर्व महत्वपूर्ण है। रामगंगा के टाइगर रिजर्व से बाहर के जल समेट क्षेत्र में सन् 1962 से भूमि संरक्षण कार्य किये जा रहे हैं ताकि जलाशय की आयु बढ़ सके। इन कार्यो पर अथाह धन व्यय करने के बाद भी भारी मात्रा में भूमि कटाव हो रहा है जबकि टाइगर रिजर्व के अन्तर्गत भूमि संरक्षण पर कोई व्यय न किये जाने पर भी भूमि क्षरण काफी कम है। इन समस्त तथ्यों से आरक्षित क्षेत्रों के महत्व पर स्वतः ही प्रकाश पड़ जाता है।

रामगंगा के कुल जल समेट क्षेत्र के 22 प्रतिशत में खेती होती है। यह पहाड़ी इलाके की सीढ़ीनुमा खेती है जो मुख्यतः वर्षा पर निर्भर है। कुछ वर्षो पूर्व तक पहाड़ी खेती में रसायनिक खाद एवं कीटनाशकों का प्रयोग नहीं होता था परन्तु इधर इनका प्रयोग काफी बढ़ गया है साथ ही फलोद्यानों का क्षेत्रफल बढ़ने से भी कीटनाशकों के प्रयोग में बढ़ोत्तरी हुई है। यह कीटनाशक वर्षा ऋतु में बहकर रामगंगा में आते हैं और जलाशय में एकत्र हो जाते हैं जिससे जलाशय की मछलियों को हानि होना स्वाभाविक है। इन मछलियों पर अनेक मांसाहारी पक्षी, उदबिलाव, मगर, घड़ियाल आदि निर्भर रहते हैं। मांसाहारी पक्षियों के बारे में विश्लेषण करने पर एक शोधकर्ता को यह जानकारी हुई है कि कीटनाशकों की बहुतायत के कारण इनके अंडे समय से पूर्व टूट जाते हैं और इन पक्षियों के प्रजजन को बाधा पहुंचती है। इसके अलावा नदी में भांग आदि अनेक खर पतवार पौधों के बीज बहकर आते हैं जो पार्क के अन्दर रामगंगा के किनारे तथा मझाड़ों में फैल जाते हैं और वहाँ से अन्यत्र फैलकर घास के मैदानों को क्षति पहुंचाते हैं। इन खर पतवारों को नष्ट करना भी संभव नहीं हो पाता है चूंकि हर वर्ष नदी में बीज बहकर आ जाता है। इसके अलावा कुछ लोग मछली के नाजायज शिकार के लिये प्रोजेक्ट टाइगर क्षेत्र में घुस जाते हैं जिससे मछली के अलावा अन्य जीव जन्तुओं को भी हानि हो सकती है।

From Hailey to Corbett - 75 years of Conservation

* Dr. Prashant Singh

Christmas 1929. Edward James Corbett organised a hunt for Sir Malcolm Hailey, the Governor of United Provinces. A tiger and a few leopards fell to the hunters guns. The "success" of this hunt in the jungles of Kaladhungi would ironically go on to be one of our nation's greatest success story in wildlife conservation.

It was this hunt which brought Jim Corbett close to one of the most powerful man of his times, Malcolm Hailey. They soon became close friends, sharing common interests in Wildlife and Shikar. They often fished together in Nainital Lake and some other lakes close by. But their favourite fishing spot was the Ramganga. Here they fished for Trout and Mahseer. This location had the most picturesque setting. The forests were unspoilt with abundant wildlife. The river was "well stocked" with fish. There were "Magars", Otters, rich bird life and spotting a leopard or a tiger in the area was common.

It was a result of these fishing trips that Corbett influenced Hailey to set up a protected area which would preserve the rich flora and fauna of this place.

In 1933 a Wildlife Convention held in London outlined the need for conservation and defined hunting and trading laws for wild animals.

Subsequently over 300 square kilometers of forest land in the Ramganga river valley was marked and all hunting in this area was banned for the next five years.

Soon the United Provinces National Park Bill was approved. Exactly 75 years ago, a reserve was established on a permanent basis. This reserve was named after Hailey and was the first of it's kind in India.

Jim Corbett and a senior Forest Officer E.A. Smythies worked closely for the setting up of the reserve.

When Sir Malcolm Hailey left his post, there was an unsuccessful move by some people with vested interests to reduce the size of the reserve. It took more than four decades for the reduction in the size when a Dam was finally built on the Ramganga at the Southern end. This took away more than 40 square kilometer area of land and had an adverse effect on a number of species.

After Jim Corbett's death the reserve was renamed "Corbett National Park". The Park could not have got a better name. Corbett was one of the first true conservationists. Even though his skin color was white , his heart was truly Indian. He loved India and her people. The locals loved him as much. On my last trip to Corbett's home which is today a museum. I was surprised to see the number of shops named after this great man. From Tea stalls, Barber shops,Tailors and Cobblers .....the name "Corbett" is all over. The man may have long died, but his memory still lives on. In the hearts of the common man. Some are probably the descendants of the same village folks for whom Jim was the only ray of hope. The savior who would rid them of the "man eaters of Kumaon".

Today the name Corbett is synonymous with Corbett, the hunter turned conservationist. The land of the Tiger. A place where this animal still roars in all his majesty. A place where he still walks free and is wild. A place where there is still hope. Hope for all those wildlife lovers and conservationists who would love to see this most beautiful of God's creations ---- The Royal Bengal Tiger, live on; for many years to come.

*14 Municipal Road, Dehradun

The evolution and present status of private sector tourism resorts around Corbett Tiger Reserve

*Duleep Khatau

Wildlife tourism is a new and rapidly growing sector having both positive and negative impacts on wildlife conservation. Although the wildlife tourism sector provides a significant amount of employment to the local population and is an important source of revenue generation for the government, at the same time it may also have a number of adverse effects on the wildlife of the area. These effects may be either as a direct result of the disturbances caused by wildlife watching activities as well as indirectly from the construction and operation of tourism facilities and the general levels of disturbances caused by tourism related activities. The form of wildlife tourism currently practiced in India creates immense pressure on the biodiversity of the region, thereby conflicting with the broader objectives of biodiversity and wildlife conservation. Creation of protected areas is considered a significant mile stone in the history of wildlife conservation; however the promotion of wildlife tourism in protected areas has limited the scope of wildlife conservation. Most of the protected areas of India which have charismatic faunal diversity and connectivity to main cities are facing growing pressure from the sector of wildlife tourism and the Corbett Tiger Reserve is no exception.

The Corbett Tiger Reserve located in the foothills of the Himalayas is famous for its rich biodiversity. The high tiger density of the region has caused Corbett to become a major hub of wildlife tourism. However, in recent times, it has emerged as a burning example of the degradation of protected areas due to wildlife tourism. The tourist influx in Corbett has doubled from about 1 lakh visitors in 2004-05 to about 2 lakh visitors in the year 2009-10. The construction of large number of resorts and hotels right on the periphery of the Corbett Tiger Reserve has caused several negative impacts, directly on the wildlife as well as indirectly on the various local resources, one of the most important being water.

At present day, more than seventy five resorts are operational around the Corbett Tiger Reserve, and many more are in various stages of construction. Unfortunately most of these are right in the middle of the critical wildlife corridors that connect Corbett with adjoining forest areas. The stretch between Ramnagar and Mohan, on the eastern boundary of the Corbett Tiger Reserve is one classic example. The several resorts at Dhikuli have effectively blocked the Kosi wildlife corridor, considered one among the 10 important wildlife corridors of the Terai Area Landscape. Wildlife corridors provide solutions for the problem of habitat fragmentation and are especially important for the movement and dispersal of animals with large home ranges such as tigers and elephants. Corridors are critical for maintaining large effective breeding populations as isolated populations are threatened with the risk of local extinction. Hence, protecting these wildlife corridors is of vital importance if we are to secure the tiger and elephant populations of Corbett. However, the continuous line of resorts that have mushroomed all along the boundary of Corbett Tiger Reserve has formed a physical barrier which is preventing wild animals from reaching the Kosi river corridor. This is causing an irrevocable break in the continuity of the Terai Arc Landscape. If these important wildlife corridors get completely blocked then we can expect inbreeding depression to occur among the wild animals whose home ranges would get drastically reduced.

* Chairman Corbett Foundation, Dhikuli PO - Ramnagar Distt. Nainital

Tourism has significantly changed the land use pattern of the region, as small hutments and agricultural land that animals could easily cross have been replaced by large imposing resorts surrounded by high concrete walls that effectively curtail the movement of wild animals. Also, several of these resorts are practicing extremely unsustainable forms of tourism. Although clear norms exist prohibiting any kind of construction in close proximity of *Riverine* systems, several resorts have extended their properties right up to the Kosi River. Some have even diverted the natural flow of the river. These resorts are drawing excessive water from the Kosi and are also dumping their waste matter in to the River, thereby causing pollution of the Kosi River, which is the lifeline for the wildlife of this area. Some resorts also wash their laundry in the river itself, causing additional pollution of the river water with detergents and other chemicals. Unsustainable fishing activities along the Kosi River have also affecting adversely the several fish populations inhabiting this *Riverine* system, even causing behavioral changes in them.

Very few of these resorts practice responsible and sustainable tourism. Many of the resorts around Corbett are practicing a very different form of unsustainable commercial tourism where the owners are marketing them as "party" or "fancy wedding" venues to cater to a different type of clientele who have no interest in wildlife activities. A majority of resorts have regular "DJ Nights", where loud music is blasted late into the night. This is causing additional disturbance to the wild animals. Several cases of birds with damaged auditory systems due to these extreme sound levels have been frequently reported. The loud noise and bright lights from these parties have been causing wild animals to move farther away from these areas, thereby significantly reducing the habitat area actually available to wildlife.

Several of these resorts are also stooping to malpractices such as "baiting" to guarantee tiger sighting for tourists. This has consequently increased the tigers' familiarity with humans causing them to lose their inherent fear of man, thereby causing behavioral changes in the animals. Increased familiarity with humans compounded by loss of their natural habitat is forcing these animals into conflict situations with humans. Instances of human-wildlife conflict have significantly increased in the Corbett landscape over the last decade. Scientists have propounded that wildlife watching from extremely close quarters affect the behavioral ecology of wild animals. Most of the drivers who operate the tourist safari vehicles in the Corbett Tiger Reserve drive their vehicles right up to the wild animals, thus causing disturbance which may cause increased stress levels in the animal. Also, there have been several instances where tourists have disturbed wild animals while they have been feeding or resting.

There is urgent need for stringent measures to regulate tourism around the Corbett Tiger Reserve if we are not to lose this important wildlife habitat which is such an integral part of the Terai landscape. Unsustainable tourism activities would negatively impact the tourism sector in the long run. Habitat degradation and disturbance of wildlife due to tourism activities would eventually cause significant loss of wildlife in the area, and this in turn would impact the influx of tourists into Corbett. Immediate action is the need of the hour or else we stand to lose the rich wildlife inhabiting 'the land of trumpet, roar and song'.

A Tiger in Ambush
Photo : A. S. Negi

The Burning Problem of Corbett Tiger Reserve – Man eating by Tiger

*RAJEEV MEHTA

Tigers and Jim Corbett go a long way, so much so that in India and indeed the world, you cannot discuss one without mentioning the other. A visionary like him as well as others like F.W. Champion advocated and formed a P.A on 8th August 1936 naming it Hailey's National Park. It has been nurtured over the years despite a lot of hindrances both natural and unnatural sustaining itself with what may be the largest population of Tigers living in the wild.

The park as of now is spread over an area of 1288.34 sq kms and is now called Corbett Tiger Reserve (CTR). It comprises of Corbett National Park, Sona Nadi Wildlife Sanctuary and a buffer area of 466 sq km. Other than tigers and elephants endangered species like mugger, gharial, leopard cat, ghoral, sehrow and mahseer are found in the region. Others that can be seen are sambhar, hog deer, spotted deer, barking deer, sloth bear, jackal, jungle cat, yellow throated martin, smooth Indian otter, black nape hare etc. The landscape has home to over 600 species of birds both resident and migratory. 49 species of diurnal raptors are found here.

On 1st April 1973, Project Tiger was launched in Corbett National Park. Objectives included measures to protect and conserve the tiger and the eco system of the Reserve. As time passed by, Mr.C.B Singh, the first Director of the Tiger Reserve set high standards by leading from the front to protect the tiger and its habitat. It's by following those standards that the park today boasts of the highest population of tigers living in the wild anywhere in the world.

Today CTR is booming with tiger population and the concerned authorities need to come together and ensure that it can be, if not enhanced then at least it is sustained.

Although there have been cases of tigers turning man eaters in CTR, due to old age or being wounded, it has been noted lately that another main cause of tigers becoming a man eater is the increase in their own population. The CTR area stretching over 1200 sq kms now does not seem enough to enable each tiger to mark his own territory. Therefore as a result the more dominant ones edge out the weaker ones to the buffer zone who in turn are forced to move towards villages resulting in cattle lifting and occasionally killing humans. The only solution to this would be to increase existing buffer area of the CTR just the same way as it was done earlier by including Sona nadi, Kalagarh, part of Ramnagar and West Tarai forest divisions as buffer zones in the 1991 by the then Director and now retired Chief Wildlife Warden, Uttrakhand, Mr. A.S. Negi. It was during his tenure that three revenue villages on the southern side of the CTR, namely Dhara, Jhirna & Kothirao were successfully relocated to make the Reserve more inviolate. This historical event provided not only the much needed space for the tigers but also made it inviolate and better managed to accommodate the present day population of tigers being boasted as highest density population anywhere in its range.

Interestingly the problem faced now is that the population of tigers is so high that the area is

*Chitra Cinema, near Railway Station, Haridwar

now vulnerable to poachers. The density of tiger population has gone up to 19 individuals per 100 sq kms - thus raising the man-animal conflict and interspecific fighting resulting in mortality.

The Recent Man eating incidents in Corbett

During November 2010 to Feb.2010 a tiger turned man eater and took toll of six innocent people five of them from Sunderkhal village some 15 kms from Ramnagar on Ranikhet road close to Dhangarhi entrance gate. This entire village is on encroached forest land of Ramnagar forest division. These people moved here in 1974 as a result of political support and in spite the department having succeeded in legal battle they have not been evacuated due to political pressures. The initial few families have now swollen to 324 families making it a human problem. The families own little or no farm land and have to solely depend on the Tiger Reserve for their sustenance. Being very close to the CTR they along with their domestic stock are always vulnerable to highest degree of man animal conflict.

The following persons were killed by man eater during three months from Nov.2010 to Feb.2011. :

Nanda Devi 12.11.2010
Kalpana Devi 18.11.2010
Devki Devi 29.12.2010
Shanti Devi 9.1.2011
Ram Shankar 12.1.2011
Puran Chand 26.1.2011
Kanti Devi 6.2.2011

The tiger had to be declared man eater by the Chief Wildlife Warden and was shot dead. The post mortem report indicated that the tiger was a mature male with some old injuries on his shoulder. Human flesh was found in his stomach during post mortem which confirmed that this very animal was man eater.

Interestingly after the man eater was shot dead, another person was killed by yet another tiger in Sunderkhal area causing fear and tension once again. The point to be noted here is that all the attacks took place between 12 noon to 2.00 pm, a time when the villagers are inside the park collecting firewood and other forest produce. This illegal entry to the park has to be stopped to avoid further attacks by tigers on human beings. These 324 families are needed to be relocated to some suitable place in order to relieve them from the constant fear and to reduce pressure on the CTR. Most of them risk their lives by entering the park to earn a pittance. On a daily basis they enter restricted areas for firewood and fodder for cattle thus using these as a source of income. There are people from Ramnagar who have enrolled people from the village to collect 'kari patta'. They are paid Rs.4.50 per kg for all the risks they take. The collected herb is then sold outside for Rs.45 per kg. Shifting is also essential in order to facilitate the free movement of tigers and other wild animals to adjoining forest areas. This is possible only with a strong political will and continuous persuasion by forest department and other people interested in conservation.

Mahaseer angling in Ramganga

*N.S. Negi

Mahaseer is a fresh water fish which is found in some rivers and reservoirs in India and its neighboring countries. It grows upto to a huge size weighting upto 100 kg or more.

Fishing is one of the most popular sports all over the world and Mahaseer is considered to be an excellent sport fish for its size and tremendous strength.

Mahaseer are omnivores and feed on various other species of smaller fish, frogs, snails, crabs, flies, insects and weeds available in the river in different seasons. Taking advantage of their feeding habits artificial bates of different shapes, sizes and colors resembling their natural food are used by anglers to lure them. Fishing with rod and line by using these bates is popularly known as "Angling".

I had seen many people angling in rivers Ganga, Yamuna, Tons, Song and Susuwa and their tributaries, around Dehra Dun where very good Mahaseer fishing was practiced upto early seventies. It was only when I was posted to Corbett National Park in the year 1962 that I was advised by some of my friends that I should take up to this sport because river Ramganga had Mahseer in plenty. I bought a spinning reel (Mitched 300), a fiber glass rod and some artificial baits (brass and silver spoons, spinners and few plugs). I took my fishing lessons from my angler friends who used to regularly visit the park. I found this sport very absorbing and exciting and enjoyed the pleasure of angling in Ramganga, during the entire period of my stay in the park. The biggest mahaseer I caught weighed 17½ kg. This fish I caught just below the Khinanauli forest rest house a little distance upstream from Gathia rao. I had hooked another large fish in the same pool and had played it for nearly twenty minutes before it came around a rock and in a big jerk broke the line and got away. The bait used was a wooden plug.

Fishing in Ramganga inside the park was allowed at that time and many anglers, both Indian and foreigners who visited the park enjoyed angling in the river. The biggest mahaseer which weighed 40 lbs was caught in a pool near Gairal by Mr. Tom Alter of Mussoorie (a famous movie artist).

The anglers who fished very frequently were Brig. (Retd.) Prendergast from England (Ex. Indian army), Mr. Fred from Austria, Mark Tully and Melvil Demelow from BBC, Sir Patrik Shaw Australian High Commissioner in India, Mr. Puri from Piru Madara (Ramnagar), Gogi Sandhu from Rudrapur, Narendra Singh Ji from Dhampur, Brijendra Singh from Delhi, Dr. Wysham Christian Medical College Ludhiana, Mr. Karman from Dehradun and Mr. Nadal Spanish Ambassador in India.

Brig. Prendergast who used to stay in the park for two to three months in his own caravan car during his first visit had borrowed my fishing gear. He had caught a 14 pound trout in Afghanistan with a fly rod. Since it was winter season he could only catch a few Mahaseer. He visited the park next year and this time he was equipped with a fly fishing rod. He fished in Ramganga during his long stay and caught several Mahaseer weighting upto 12 lbs and many Indian Trout. Fly fishing needs a good casting practice and skill. The angler has to

*Retd. Assistant Park Officer, Corbett National Park, Green Cottage, Bala Hisar, Mussoorie

change casting direction according to the direction of the wind which necessitates wading in the water. Smaller rivers where the water is not very deep and currents not very fast are considered very suitable for this fishing.

In the year 1974 construction of Kalagarh dam was completed as a result of which about 16 Km length of Ramganga was inundated in the reservoir. Some more species of fish such as Lanchi and Rohu were also introduced. Besides Mahaseer I caught some Lanchi which weighed upto 8 kg. In the year 1987 fishing was banned inside the park, after which fishing permits were issued only for the stretches of Ramganga above Domunda only.

I do not know about the present status of Mahaseer. Some anglers feared that Lanchi in the course of time reduce Mahaseer population as they grow to large sizes and feed on Mahaseer.

Once I was having my evening meal at about 9 PM at Dhikala when a messenger came from Ramnagar and delivered to me a message from the Wildlife Warden in which I was informed that a VIP would visit Dhikala the next morning for a short visit and would have breakfast and lunch. I was expected to arrange some non-veg. which was available only at Ramnagar, a place 52 Km away. It was a moonlight night and I decided to try my luck and picked up my fishing tackle and asked the driver to take me to a place named Gaujera where there was a deep pool. Because of the poor moonlight. I could not catch at the desired spot and it stuck between the rocks on the far bank of the river. There was no way of retrieving it so I had to pull the line and break it. I tied another lure, this time a Mepps size 5 and in the second cast was able to hook a sizeable Mahaseer which I was able to land with some difficulty. It weighed about four kg. I tried again and in the process lost two spoons one of these was taken by a large mahaseer which broke my line and got away, the other one was stuck between the rocks and could not be retrieved. I had already caught a fish which was enough for the lunch so I returned to the camp. This incident added to my experience that Mahaseer feeds at night and can be caught in moonlit night.

After my retirement I came to know that some prominent anglers had formed an Association named the Environment & Anglers Association in Dehradun. I became a member of this Association. I went on fishing trips to river Tons along with Late Lt. Gen. (Retd.) Jasbir Singh, Mr. M. Nath, his younger brother Mr. Vijay Nath of Dehradun and Mr. R.S. Rautela of Mussoorie. These gentlemen had caught several Trout in this river previously and were very keen and experienced anglers. We stayed in a rest house situated on the right bank of river Ramganga outside Corbett National Park at Bandran and during our four days stay fished about ten km stretch of this river but none of us could catch a single fish. I was told that the water of the river was not very clear because it had rained a few days earlier.

Next year in the end of September our team went to Vyasghat, Junction of river Nayar with Ganga where very good Mahaseer fishing is reported during this time of the year. We camped at the Junction of rivers Ganges and Nayar and fished there for five days. During our stay, Gen. Jasbir Singh caught a golden Mahaseer which weighed about ten kg. It was unhooked and put back in the river, our members strictly follow the catch and release practice to conserve the Mahaseer and keep the sport alive.

On our ways to Vyasghat we saw large nets fixed across river Nayar at several places.

Mahaseer Angling in Ramganga
Photo : A.J.T. Johnsingh

Corbett of Kumaon

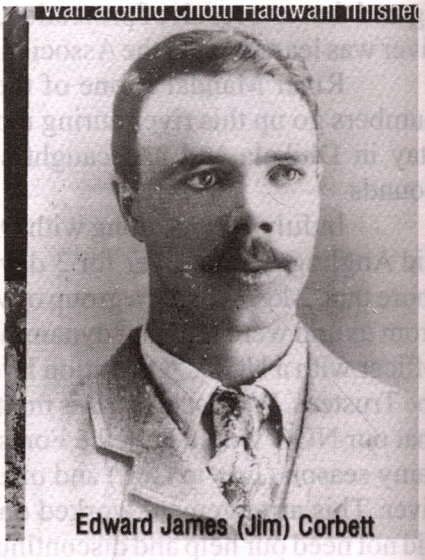
***Walter Luther**

Col Jim Corbett

In 1944 there appeared exciting book on shikar which was destined to be counted among classics of adventure. "Man-Eaters of Kumaon" was an amazing first book which brought sudden fame to its author, Colonel Edward James Corbett. Now translated into seventeen languages, an introduction to the book is hardly necessary in our day. It has appeared in scores of editions including several paper backs and is read and enjoyed all over the world by millions of people, majority of whom have never pressed a trigger or passed through an Indian jungle.

Corbett was nearing seventy when he sent the manuscript of Man-eaters of Kumaon to the Oxford University press. Its author, a modest Anglo Indian, had expected little and never thought that the book of his experiences with the man eating tigers of Kumaon would become a landmark in the world of adventure stories. The publication of this book took the world by the proverbial storm and Corbett, a household name in Kumaon, became known all over the world as the greatest hunter of our time. But Man-Eaters of Kumaon was not just a book on shikar adventures; it was a brilliant study of that most majestic animal of the Indian forest- the tiger, and a sympathetic understanding of its behavior under difference circumstances.

In Kumaon, which lies in the foothills of the Himalayas, life in the tiny villages situated in the heart of thick forests is simple, lonely, and far removed from all civilization. The appearance of a man-eater near any of these villages can become a terror and dread which words cannot describe. In his story of the Thak man-eater, Corbett tells us that the dread of this single animal not only terrorized the population of villages scattered over an area of fifty square miles, but also held up work of some ten thousand men felling trees in the forest. Again, in Garhwal, for eight years more than fifty thousand villagers lived in nightly fear of the Leopard of Rudraprayag. These villages of Kumaon connected with civilization by dusty paths that ran through thick forests, could send news of man-eaters only through the 'dak-runners' and often the man-eater had time to strike twice or three times before news of one victim reached the District officers. At such time both official and unofficial appeals from the villagers came to Corbett, who spent over three decades in pursuit of man-eaters, during which time he rid the district of Kumaon of a dozen man-eating tigers and leopards.



Edward James (Jim) Corbett

Corbett's early life was spent in Nainital. Situated 6,400 feet above sea level in the Himalayan foothills, Nainital nestles in a valley running east and west. It is surrounded on three

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sides by hills with a lake in the centre about 1,500 yards long and 500 yards broad rising steeply from the lake the hills are well wooded, mainly with evergreen oak and on one slope with a beautiful forest of Cypresses. Dotted all over these hills are red-roofed houses. Gurney House, where Corbett lived, still stands on the western slope some five hundred feet above the lake. Bought by an Indian friend of the Corbetts, it is used by them only as a summer holiday home and in all essential respects is the same as it was when the Corbetts lived here. The old furniture, old books, old pictures, including two of Corbett's etchings hanging on the wall, are still there.

Corbett belonged to a rather large and mixed family. At 21 Mary Jane was left a widow, her husband Charles Doyle being killed in the Sepoy Mutiny of 1857. He was survived by the young widow and three children. She later married Christopher Corbett, a widower, who brought with him his two sons and a daughter from his first marriage. Christopher Corbett and Jane had six children of their own and Jim was the second youngest of these six. The family spent nine months in Nainital where the children went to school and Corbett had his early education. In winter the family migrated to their house at Kaladhungi. This place at the very foothills was surrounded thick forest, teaming with game of all sorts, and it was here the Corbett acquired his first love of the Jungle. Although he was given lessons in the rudiments of Shikar by his eldest brother, he was essentially a self-taught man. From his early life he showed all the qualities that make a good hunter and was destined for jungle stardom. Endowed with a muzzle-loading gun, he had roamed these forests day and night and they held no fear for him.

Schooling over, Corbett was compelled to remove himself from his family and from the hills and forests he loved so much. He became Transhipment Inspector at Mokameh Ghat. The Ganges river at this place had no railway bridge and the traffic and goods had to be trans-shipped from one side of the river to wagons waiting on the other side. His days were hardworking, a routine interrupted with no holidays even on Sundays. But he worked at this strenuous job for two decades and has devoted the last few chapters of "My India" to the nostalgic memories of Mokameh Ghat.

Corbett served in the two world wars. In 1917 he was commissioned in the Indian Army. Being a man from the hills he had immense physical strength and powers of endurance and acquitted himself well as an officer. It was during this period he helped to raise Labor Force, part of which he took to France. He was past sixty when the Second World War broke out, but 1944 found him a Lieutenant- Colonel in the Indian Army. He was given the difficult job of training men for jungle war fare. He, however, found himself well- equipped to come to terms with this very arduous job, for he had been long in contact with the jungle and possessed all the skill he needed in adapting himself to any emergency and to any situation in it. He set up his camp some ten miles away from Nainital. It was an exhausting grind, and Corbett, well advance in age, lived on his physical capital. He was struck down by serious illness and was laid up for many months.

Corbett remained a bachelor, but he had a constant companion in his siter Maggie, who loved and nursed him devotedly, and her companionship ever enriched his life.

Corbett was a familiar figure in Nainital. He was often seen sitting by the lake with his fishing rod or trolling in a boat. A friend of the rich and the poor, he counted among his acquaintances Governors and poor and simple farmers living in the villages of Kumaon. To these villagers he was a savior, a friend, a helper, and was held in deep awe and respect by them. He was an adept hunter, and the techniques he applied in shooting the man eaters were often unique. On two occasions he dressed up like an Indian village woman in a brightly colored sari, using himself

intentionally as bait for a man-eater. He also had a flare for mimicry and learned to imitate the calls of tigers and leopards. That he manage to lure the man-eater of Thak to its death by giving her a call, is enough proof of his dexterity. A notable feature of all his pursuits after man-eaters in his demonic determination and inflexible patience to follow and destroy the beast. He willingly risked his all for these campaigns, though they lacerated his nerves and wore him out physically. He never undertook these campaigns for a material reward or for glory, but in his own words "for the satisfaction at having done a job that badly needed doing, satisfaction at having out-manuvered, on his own ground, a very worthy antagonist; and greatest satisfaction of all, at having made a small portion of the earth safe."

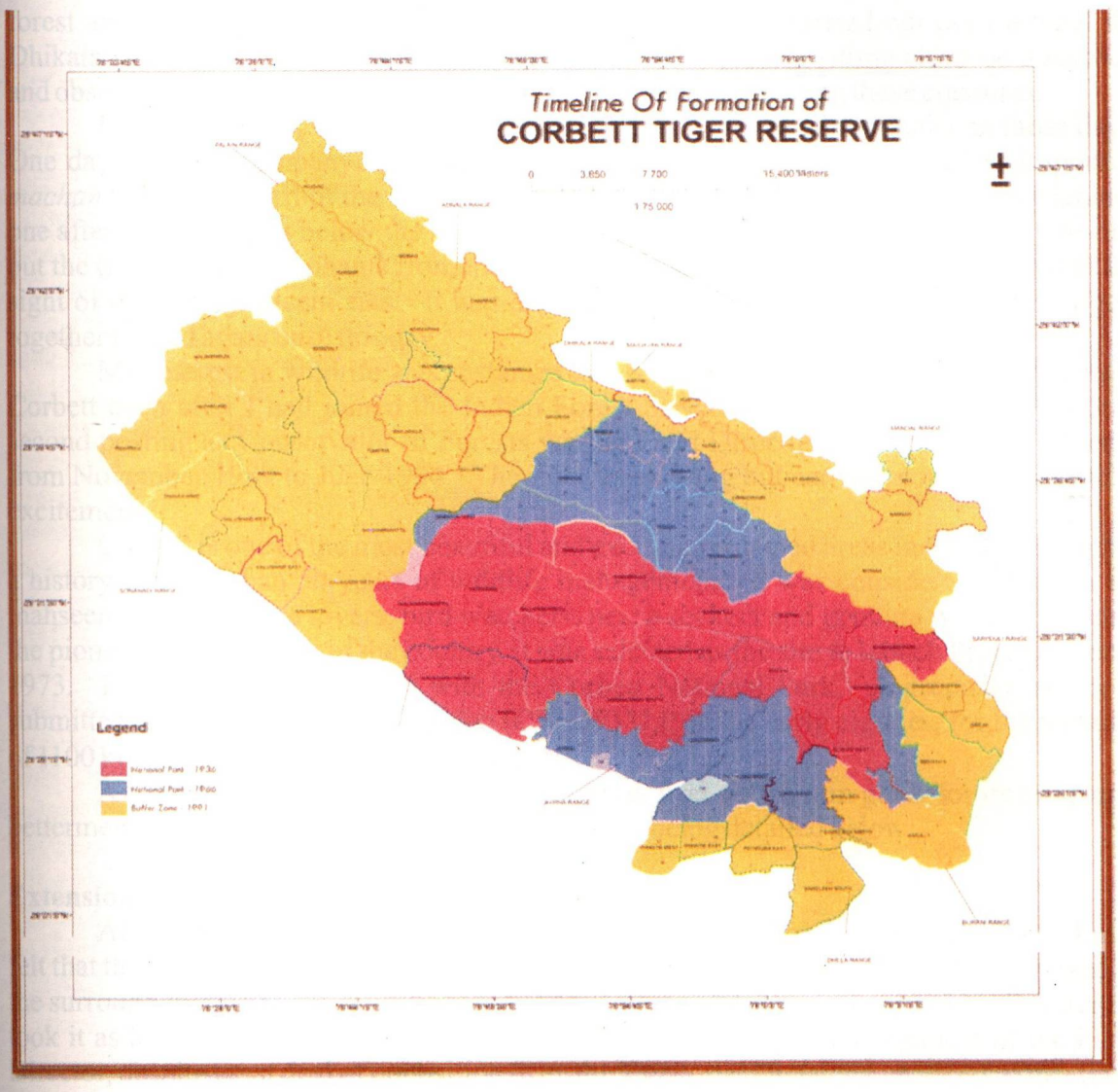
In all Corbett wrote six books. An admirable feature of his Shikar books is his simple and direct style, in which alone his stories could have been told so effectively. The subject matter of these stories is always tragedy, but Corbett tells them without grief and often with intense beauty.

During one of his sojourns Corbett stayed in the dak bungalow at Champawat. "I have a tale to tell", he says, "of that bungalow". But he did not tell it in the story of Champawat Man-eater, for he thought "tales beyond the laws of nature" did not consort well with jungle stories. Did Corbett believe in ghosts? He gave no possible explanation for the story of the scream he heard in the night near Thak, but he did assert that it was a very real experience to him. Corbett did write down the story of the dak bungalow at Champawat with many others and was actually contemplating their publication, but for some unknown reason changed his mind.

In 1947 both brother and sister left India and settled down at Nyeri in Kenya. Besides his interest in a coffee estate of which he was a joint owner Africa offered him unlimited scope for animal photography, which had become a passion with him. 'Tree Tops' was very near to his home. It was a hut built on the branches of a great ficus tree, which gave a clear view of a lake and forest where elephant, rhino, leopared, waterbuck and other animals were regular visitors. It provided a place for Corbett to appease his enormous appetite for photographing the wild animals and watching them for hours. His last book "Tree Tops" is an account of the Queen's (then Princess Elizabeth) and the Duke of Edinburgh's visit to this hotel in the trees. Corbett was invited to accompany the Royal visitors.

There are several stories regarding Corbett's death- that he was killed by a lion in Africa, that a snake bit him. These are not true. The area of the jungle where he played with death so often was also the place where he found peace and fulfillment of his childhood dreams. He loved the jungles and the jungles could not kill its lover. He was privileged to die a peaceful death on 19th April 1955, after a brief heart attack. He now sleeps in cemetery at Nyeri.

This then, this humble quiet unassuming man, with a tall youth full frame and blue eyes, was Corbett, one of the greatest hunters of our time, who loved the animals and the birds and God's beautiful out-of-doors, and one who used his courage and talent for the service of his fellow men. He was made an honorary warden in Africa. India rewarded him with the Kaisar-i-Hind Gold medal and gave him the freedom of the forests-a privilege he prized above all titles; (he was also an O.B.E.). And finally, lest his services be forgotten the Hailey National Park, created in 1935 and named after the then Governor of U.P., was renamed The Corbett National Park. As long as the Ramganga flows through this park, a crystal-clear stream bordered by Shisham trees, as long as sambur, chital, barking deer, elephants and tigers roam in these forests, the name of Corbett will be remembered and will live in the hearts of the Indian people.


Timeline Of Formation of
CORBETT TIGER RESERVE
0 3,850 7,700 15,400 Meters
1:75,000
Legend
National Park - 1936
National Park - 1966
Buffer Zone - 1991

MY CONTRIBUTION TO CORBETT TIGER RESERVE

*A.S. NEGI

Corbett Tiger Reserve fascinates me, like it would fascinate any nature and wild life lover. My first visit to Corbett was in the early sixties after my school examination. My stay that summer, with my elder brother who was posted at Dhikala as A.P.O. created in my tender heart a niche for forest. wildlife and nature. My subsequent visits strengthened my love for forest and wildlife. In those days, forestry operations were carried out even around the Dhikala chaur (grassland). I spent long hours almost everyday, sitting alone on a *machan* and observing wild animals and birds. I never got weary of watching these creatures.

Baiting of tigers for viewing and photography was a regular practice in those days. One day, while accompanying tourists for tiger sighting. I was put on a less important *machan* with a few staff of the Park. We were lucky. Five tigers made a roaring appearance one after the other, just below the *machan* on which we were sitting, after a *hanka* (driving out the tiger by tame elephants from the dense grass cover). I was extremely excited at the sight of these magnificent cats. It was a lifetime experience, for I have not seen 5 tigers together in wild again until this day.

My interest in wildlife was sustained and further developed by my regular visits to Corbett even after I had joined the Indian Forest Service. It was a coincidence that my second posting as Conservator of Forests was as Field Director of Corbett Tiger Reserve from November 1989 to June 1994. The job was exciting but carried more challenge than excitement.

Corbett is one of the most beautiful and exciting protected areas in the world and has a history of more than 50 years of wildlife management. It was considered a heaven for mahseer anglers, nature lovers, bird watchers, peace seekers and genuine wildlifers. Being the pioneer National Park of the country, it was selected as the site to launch Project Tiger in 1973. It was then coterminous with the Corbett National Park, A proposal had been submitted to the Chief Wildlife Warden (CWLW) U.P. in the early eighties, for the addition of 1100 km^2 as buffer but no action had been taken.

As Field Director of Corbett Tiger Reserve, I set out certain goals for its long term betterment. Some of the important achievements are being detailed below.

Extension of Tiger Reserve:

At the time I joined CTR as Field Director, the area of the TR was only 521 sq.km. I felt that the spill-over of wild animals from the core area was not being properly managed in the surrounding buffer, the wildlife management status of the two areas being so different. I took it as a challenge to get the buffer areas included under the management of the Field Director, despite great deal of opposition from the Territorial Divisions. A series of meetings were arranged between the CWLC and the Principal Chief Conservator of Forests (PCCF) and finally, in October 1991, the entire 611 km^2 of Kalagarh Forest Division, 97 km^2 of the Ramnagar Forest Division and 89 km^2 of the West Tarai Forest Division were transferred

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under the charge of the Field Director. This included the prime elephant habitat of 301 km^2 Sonandi Sanctuary of Kalagarh Forest Division, notified in 1987. The area of Corbett Tiger Reserve swelled to 1319 km^2 with three protection categories.

Core Corbett NP – 521 km2, Sonanadi Sanctuary 301 km^2 and Buffer Area – 497 km^2. This extension of the Tiger Reserve has proved to be a boon for the long-term conservation of the tiger and elephant of this tract. Due to well managed and sufficiently large buffer, today CTR has the highest density of tigers in its entire range in Asia.

RELOCATION OF VILLAGES:

Four villages on the southern boundary of the park, Dhara, Jhirna, Kothirao and Laldhang, with a total population of about 4000 were proposed to be relocated to new sites since early seventies. After the extension of the Tiger Reserve to include part of the West Tarai Division in the South, these villages came deep into the Tiger Reserve and had neither all-weather roads connecting them with the main roads nor electricity. There were volumes of correspondence and their shifting was always deferred due to one or the other reason. Even the villagers had differences among themselves which were difficult to sort out. As soon as I took over as Field Director, delegations of villagers came to me with their desire to shift to new location, because of the difficulties that they had to face in the form of wildlife damage and lack of development activities. I called a meeting of the villagers from all the four villages in June 1991, and it took me 6 hours to sort out differences between the villagers regarding the allotment of a particulars piece of land in lieu of the present land. I was happy to have been of help in resolving the differences. After a lot of persuation, Government of India agreed to pay for land development, shifting of household materials, building of an approach road, supply of drinking water, construction of huts etc. After more than a dozen meetings with the villagers, and pursuing the proposal at all stages, Dhara, Jhirna and Kothirao were finally shifted to their new locations by April 1994. Now, one can see the result of these abandoned village lands returned to the wilds again. The sites have become grazing grounds of wild ungulates, and one can see pugmarks of tigers and leopards and hear frequent alarm calls of deer from the Jhirna Forest Rest House. The villagers who are now settled on either side of Ramnagar-Kashipur road now have fertile irrigated land, their children can go to school and they don't have any conflict with wild animals. The proposal of Laldhang village which was processed separately due to certain technical difficulties did not come through during my tenure and part of the village still remains at Laldhang dispite the forest land having been cleared and allotted to them. I am sorry for the inhabitants of this villages who could not be relocated. Let us hope that the dream of the peop;le of Laldhang village will also come true one day and they will live in a place where there won't be any conflict with wildlife. We also hope that this chunk of land will be returned to the tiger.

BUSTING OF A POACHERS GANG:

Rains had set in early July in Corbett Tiger Reserve. On 14th July 1990 the field staff of Kalagarh Range while on their routine patrolling found human footprints in a nullah deep in the core area of the park. They suspected them to be of poachers and made secret enquiries in the surrounding villages in the south-western boundary of the Park. I was informed on 15th

July and same day I rushed to Paterpani on elephant back from Kalagarh to guide the operation from there. Mr. G.S. Yadav, Wildlife Warden (Western region), a police force and some more staff moved to Kalagarh on the same day. Enquiries revealed that one notorious poacher Jagga from Kalluwala village near Kalagarh who had a criminal history and was known to poach animals and illegally cut trees from the Park and surrounding areas was missing from his house. So the then Range Officer Kalagarh Mr. Ramesh Chandra Nautiyal with the assistance of his staff, kept a 24 hour secret vigil on his house with binoculars from a tree top. On 17th July late in the evening a stranger was seen coming to Jagga's house from the direction of the Reserve. The staff waited for the night and raided the house and caught the stranger who was sleeping in the house. Immediately, he was forced to lead a large force of forest staff under the command of Mr. Yadav to look for the poachers. Soon they came upon the gang of seven poachers, camping by the side of a nullah about 3 km from Paterpani. There was exchange of fire and the gang, with Jagga as their leader was over-powered. Two fresh leopard skins and 8 locally made jaw traps were recovered from them apart from the locally-made firearms and other materials. The poachers had been camping there for about a week and had killed the leopards with the help of the traps. The raiding party, after having trekked nearly 30 km that day in heavy rain across gushing nullahs and slippery hill sides, and through tall thick grasses brought the poachers to Kalagarh by night. Interrogation revealed that Jagga had been regularly selling animal skins to some people in Delhi whose names he did not revealed, inspite of tough interrogation. They were sent to jail and a criminal case was instituted against them. However, they managed to get away with only one year's imprisonment. It was an eye-opener for us as we were under the impression that the core is safe from poaching. Thereafter we tightened our security of the core area and southern boundary, and took several other measures to check the recurrence of such incidents.

MORALE BOOSTING OF STAFF-AN EXAMPLE:

On 3rd August, 1990, Mr. Babu Lal, Range Officer (Tourism Range, Dhikala), along with two of his staff, and the shop-keeper of Dhikala, Mr. Budhi Ballabh Kala was going to his headquarters by departmental boat via Kalagarh main dam with the monthly salary of his Range Staff. He saw some people fishing in the dam waters with the help of a live electric wire. While they were interrogating the culprits who turned out to be employees of the Irrigation Department (ID) at Kalagarh, some more ID employees led by a Junior Engineer, intervened and started man-handling the forest staff. They illegally detained the Range Officer and others and took them by a vehicle to Kalagarh and handed them over to the police lodging a false report that they were trying to enter the tunnel of the dam. The Range Officer tried to explain his position to the Station Officer but the police station was surrounded by the ID employees who pressurized the police to lodge a report and put them in police lock-up. Even the higher officials of the ID did not intervene. The forest road being closed because of rains the special messenger could reach my residence at Ramnagar by a motor cycle via Kashipur only at 2 a.m. I reached Kalagarh early that morning, along with the Deputy Director and other officers and staff of the Park. The Range Officer and others were in police lock-up; the Station Officer was at his residence and could only be contacted at 6.30 a.m. I explained the happenings to him and refused to leave the place and even to eat anything, until

the illegally detained staff was freed. The Superintendent of Police, Bijnor, and the Circle Officer, Dhampur under whose jurisdiction the Police Station fell, were not available to intervene in the matter. By then I had called my field staff to the Police Station fearing reprisal by ID employees who were surrounding the Police Station in a very undisciplined manner, could not sustain their false claims any longer. The Circle Officer reached Kalagarh Police Station at about 4 p.m. and ordered the release of our staff, easing the situation. My officers, staff and I had the first tea of the day at 5 p.m. after our Range Officer and others had been released. A case was instituted against the Junior Engineer and other offenders which were still pending in the Courts when I left the Reserve. Our action acted as a great morale booster, not only for the Tiger Project Staff, but for all the forest staff of the nearby Forest Divisions. The ID staff and officers must also have learnt a lesson.

DEALING WITH HI-FI POACHERS:

I had definite reports about a helicopter occasionally landing deep inside the Sonanadi Sanctuary, where the approach on ground was difficult. This was in 1990 when Sonanadi Sanctuary was not under the direct control of the Field Director (FD) but under the Wildlife Warden Kotdwar, who had some skeleton staff to patrol the area. I wrote a demi-official letter to the Secretary Forests Govt. of Uttar Pradesh and also to the District Magistrate Pauri, regarding two instances of the helicopters landing in the Sanctuary, which had come to my notice. These had to be reported to Government and District Administration as they alone could deal with Civil Aviation Authorities to check such an illegal activity. No action could be taken until December 1992 when a helicopter of India International Airways (IIA) with one leading industrialist of Delhi, two Germans and a pilot fell into the Kalagarh Dam deep inside the Sonanadi Sanctuary. I was wrongly informed by the Nainital Police that a Government helicopter, which took off from Kotdwar for Corbett Park, had been missing. The same day, a helicopter of a private company from Delhi made two landings at Dhikala and Khinanauli under Corbett National Park without permission and quickly flew off after the persons in the helicopter made some quick enquiry with the staff. Later, the same helicopter found the passengers and pilot of the missing helicopter drowned near Compartment 4 of Shisham Khatta by the side of the lake and subsequently rescued them. The Bijnor Police later misinformed me on wireless that the missing helicopter had returned safely. However, I instructed the Sonanadi Range staff to make an enquiry and also reach the bank of the lake in Sonanadi Sanctuary by boats. But since the helicopter was deep in the lake waters, nothing could be found . On 4th January, 1993, IIA wrote to the Range Officer, Sonanadi about the crash of their helicopter in the Ramganga Dam and sought his help in approaching the crash site. The Range Officer, along with employees of IIA found the crashed helicopter at the periphery of the lake in Shisham Khatta compartment 4 on side of the lake. An offence report was issued by him the same day for illegal entry into the Sanctuary. Enquiries revealed that the industrialist had taken his German guests for hunting deep into the Sonanadi Sanctuary and they wanted to land on a patch of grassland by the side of the lake, but the helicopter slid down the steep side of the lake and crashed into the water. The passengers swam to the shore with the help of life jackets. A Gujjar who was lopping a tree on a hillside nearby had seen the crash and also saw fire-arms with the passengers when

they reached the shore safely. The ID, which releases Dam water for power generation on or after 15th of November every year, released water much earlier, and in greater quantities, to help the offenders rescue the damaged helicopter and claim insurance money. Since the staff were vigilant, on 25th of January 1993, they could seize the helicopter and two boats at the Main Dam, while they were being surreptitiously removed to Delhi on two trucks. The security staff of the Dam and the ID authorities were conniving with the poachers. However, the highly connected offenders used all their influence to release the helicopter and the culprits went scot-free. They also managed to implicate some senior officers of the department to face contempt of Court. However, the case got national coverage, exposing the highly connected habitual poachers. The recurrence of hi-fi poaching by helicopters did get serious setback for a long time.

In another incident some guns were seized from a big poaching party which had entered Kaldhunga area of the Sarda Range of Haldwani Forest Division. The gang was caught by the Wildlife Warden (Western region) and forced to pay a compensation of Rs. 1,00,000. In another case, poaches of a Sambar in Haldwani Forest Division, were made to pay Rs. 1,50,000 in compensation. One State Guest was caught by me and the Deputy Director of the Reserve. Mr. Rajeev Bhartari, while illegally fishing in the Tiger Reserve. He had to pay a compensation of Rs. 25,000.

EVICTION OF ENCROACHMENTS:

Part of the forest land of Corbett National Park at Kalagarh was given to irrigation Department in the early sixties with the understanding that when the construction of the dam was finished, and extra staff and labour force disengaged, the buildings and the land would be reverted back to the National Park. Instead, over the period, the land was encroached by various people, which caused a lot of damage to the Reserve. Several efforts were made to get the land and houses vacated but they did not succeed. Finally I contacted Mr. Kaushik, Commissioner, Moradabad who arranged a meeting of the ID, concerned District Administration and the Park Management, before giving orders for the eviction of encroachments. On 19th June 1993, I organized encroachment eviction drive with the help of district administration and finally evicted about 100 encroached houses. As the houses were uninhabitable and old, they were demolished along with one cinema hall. Ten families of nomadic Kanjars, who kill reptiles and small mammals, were camping on the Reserve land illegally for several years. They were shifted to Dhampur, far away from the Reserve. Illegal cultivations were also evicted. Over 100 hectares of land so evicted was planted and now there is an excellent mixed plantation coming up on this land. I only hope that the efforts would continue and the remaining land is also returned to the Park and the growing damage due to the swelling population of Kalagarh township would be minimized.

GIVING USEFUL EMPLOYMENT TO LOCAL YOUTH:

The Reserve has been attracting tourists from all over the world but the tourist inflow suddenly increased in the late eighties reaching a figure of forty thousand visitors per season. The tourists came straight to the park and stayed in Government accommodation

hardly providing any benefit to locals. This caused great resentment among the local people and the Park Management was not able to get the desired support from them. I realized this during my visits to villages in the buffer area. I thought that one of the ways to involve local people would be to train the youth in nature-interpretation so that they could act as nature guides to tourists. A course of nature guide training for 25 local youth was organized for a period of ten weeks from 1st October 1993 and was financially supported by the Government of India. This was the first ever course of its kind in any Tiger Reserve in the country. The youths so trained were registered by the Park Management as nature guides to accompany the visitors. This was very useful for the visitors also as they could get proper guidance and information from them. Since then two more batches of nature guides have been trained.

EMPHASIS ON RESEARCH AND TRAINING:

The first ever research workshop was held at Kalagarh in May 1994 jointly with Wildlife Institute of India Dehradun. A bird watching camp was held at Lohachaur in the same year and some nature camps for school children were conducted. Mr. Rajeev Bharti took keen interest in these activities, and since then these activities are being conducted as annual features.

These are the highlights of my attempt at the betterment of this beautiful Reserve dear to so many people around the globe. I wish to continue my efforts within my own limitations even after being no longer directly involved with the affairs of the Tiger Reserve and hope that my efforts will find support from the dedicated Reserve Management. I have already started through a programme called 'Operation Eye of the Tiger' which has initiated its conservation programme in and around Corbett Tiger Reserve. It is the need of the day to strengthen conservation in biodiversity-rich areas like Corbett, which are threatened by the ever-increasing human needs.

THE HIGHEST TIGER DENSITY IN CTR

The all Indian estimation of Tiger, co-predators and their prey conducted by MoEF Govt. of India with technical support of Wildlife Institute of India and in collaboration of State Forest Department in 2005 and subsequent exercise of camera trapping in all high density tiger areas of the country has revealed that the highest Tiger density anywhere in its range in Asia was found in Corbett Tiger Reserve. In some parts of the core area the density is as high as 25-30 tigers per 100 sq.km. The presence of 4 villages deep in the TR was detrimental to growth of tiger population. By relocating these villages and returning prime land (about 400 hectares') to the TR the southern part of the TR could come at par with the Patlidoon valley (Dhikala Chaur and Surrounding area) as far as tiger population is concerned.

ELEPHANT BULLS OF RAJAJI-CORBETT ELEPHANT RANGE

*A.J.T. JOHNSINGH AND A. CHRISTY WILLIAMS

He towered over the tallest female in the group by almost one and half a foot. He stood on the edge of the Ramganga reservoir escorting a young adult female. He looked every inch a behemoth. His grace, sheer size and embodiment of power deserved the attention he was getting from us. He was one of the members of a group of elephants we were watching on Dhikala chaur in Corbett Tiger Reserve one late May evening.

The sun had just set behind a chain of hills on the far side of the Ramganga reservoir, leaving the sky painted with a hue of reddish gold. The lighting on the bull made it very picturesque. His must flow was coming to an end as indicated by the tow small wet patches along with traces of dried flow down the sides of his massive head. His interest in the young adult female was conspicuous as he always kept her side. When she waded into the reservoir he plunged in after her. It was then that we realized the fear his immense size can generate on a smaller and younger bull. The young bull, who was already in the water, hastily moved away when it became apparent to him that he was between the female and the mammoth. The young bull moved around the pair in a wide circle and eventually got out of the water.

The mammoth was fully aware of the presence of the young bull and the other members of the group but was totally unconcerned about them.He submerged himself in the water alongside the female and gently nudged her. After a few minutes he waded towards the shore churning and splashing the water all along and then came on to the dry land. The young bull, although 30m away, hurriedly moved away when the mammoth turned in his direction although totally indifferent to the young bull's presence. The twilight was soft but bright enough for us to clearly see the long massive tusks of the mammoth. The wear on the right tusk indicated that he had used it much more than the left one. As the night fell the mammoth strolled away from the group towards the forest. He walked with great dignity and poise and we painfully realized that, due to extensive poaching of tuskers, such magnificent bulls have become rare in many of the elephant ranges in India. We were fortunate that it was not the last encounter we had with him when we studied elephants for the next few days in Dhikala.

Although many articles and books, both popular and scientific, have been written on Asian elephants, the life of bulls in the natural environment has not been documented for many elephant ranges. This is largely due to the paucity of research on bulls and to some extent to the scarcity of adult bulls in most ranges due to poaching. We present here some fascinating information on the elephant bulls of Corbett Tiger Reserve and the adjoining elephant habitat. Only the bulls make Rajaji and Corbett Tiger Reserve a continuous elephant habitat entity, by moving across the flimsy corridors, which are disintegrating and shrinking day by day.

Not long ago the elephant habitat in the state of Uttar Pradesh was continuous from Katerniaghat in Bahraich Forest Divion in the east to river Yamuna in the Shivalik Forest Division in the West. Over the decades, as a result of the growing demand for more land for the increasing human population, this contiguity was broken. Now there are six isolated elephant

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populations. This major population of elephants in this tract, about 800, occurs in the Rajaji-Corbett Elephant Range. This range, about 3000 km2, spans from Kosi River, which forms the eastern boundary of Corbett Tiger Reserve to river Yamuna on the West. This forest tract includes the present Shivalik forest Rajaji National Park (which include the three former Wildlife Sanctuaries: Chilla, Motichur and Rajaji), Corbett Tiger Reserve, and parts of Lansdowne, Bijnor and Kalagarh Forest Divisions

We have urged time and again that elephant conservation in Uttar Pradesh should focus on the large Rajaji-Corbett population and its habitat which has already been broken into three isolated areas due to two major developmental projects. This includes the 14 km. Kunaun-Chilla Power channel which was constructed on the eastern bank of Ganges in early 1970s. Around the period when the power channel was built there were developmental projects such as the establishment of Hindustan Antibiotics factory, Raiwala army camp, and the settlement of evacuees from the submersion area of Tehri dam village. These have made the Chilla-Motichur corridor totally unfit for elephant herds to move between Chilla and Motichur across the Ganges.

The Second important development that has restricted the movement of elephants between Rajaji and Corbett is the Kotdwar-Lansdowne road which runs across the narrow Rajaji-Corbett corridor parallel to the Khoh river. This road construction has resulted in steep edges and building of walls which impede crossing by elephants. This hilly corridor is used only by bulls. Fortunately the elephant bulls still migrate across the power channel and the road thereby bringing about genetic exchange between the otherwise isolated populations. We have predicted that this genetic exchange would not continue for long if the fragile habitat continuity between these is not immediately strengthened by consolidating the corridors.

Six years ago, one summer evening , as the dusk was gathering. Mr. Wesley Sunderraj, a researcher from the Wildlife Institute of India, was returning to Kotdwar walking along the Khoh river. He spotted an elephant bull, a tusker, coming along a valley from the direction of the Rajaji National park towards the Khoh river. Wesley photographed the bull and stayed near the river to find out whether the bull would cross the river. By the time the bull came close to the river it became so dark that Wesley had to abandon his observation. He, however, went back to the same area early the next morning and picked up the trail of the tusker. The elephant had crossed the river, Kotdwar-Lansdowne road and walked in the direction of the Corbett Tiger Reserve.

This was the only bull that Wesley had seen using the corridor during the two year period that he studied the elephant corridor between Rajaji National Park and Corbett Tiger Reserve. The corridor is to the west of Khoh River. He discovered that the movement of cow group across the corridor was absent due to the steep terrain, which the calves cannot negotiate, and the disturbances caused by people. "The cow groups, just to ensure the safety of the calves, avoid areas of disturbances even if they are rich in food resources. Bulls, as they do not care either for the safety of the calves or for the group, could negotiate even areas of high disturbance in the cover of darkness. Wesley, however, concluded that the growing disturbances in the corridor area-grass, bamboo, fodder and wood collection- may one day stop even the bulls moving across Rajaji Corbett Corridor. If that happens, the genetic exchange between the

A single tusk make elephant in Corbett National Park
Photo : Bhagat Singh

populations on the east and west of Khoh river would come to an end forever.

The number of socially and sexually mature elephant bulls in a population in an important factor in deciding the genetic virility of the population. Sadly in many elephant ranges in India, a good example being Periyar Tiger Reserve, uncontrolled poaching of tuskers has drastically depleted the bulls leading to a disproportionate sex ratio. The sex ratio reported in Periyar Tiger Reserve is 1 male to 120 females. Although there are some tuskless bulls (makhnas) in the population this disproportionate sex ratio definitely can have two disastrous consequences. One is that a proportion of females may not be able to mate, inspite of the fact that the elephant bulls are polygamous. The other is, the cows, which can make a decision in selecting the bull, in the absence of mature bulls, may allow even younger bulls to mate. such matings in a large scale and for several generations, which is bound to happen in a place like Periyar, can eventually drastically affect the quality – size and vigor – of the elephants.

Corbett Tiger Reserve, fortunately, is one of the few places in Asia where the tuskers have not come under the shadow of the poachers gun. As a result there is about 1 bull for every 3 cows and in April 1996 when we watched elephants, 80% of the cows had either calves or young juveniles. In Periyar in 1990 only about 30 percent of the cows were reported to be accompanied by young. When a cow comes into estrous several bulls complete for her and only the best bull – sexually and socially mature, fully grown, virile and aggressive in that locality is able to mate with the female and thereby pass on the best genes to the population. This biological phenomenon warrants continued protection to the elephant bulls.

When the bulls are around 20 years old, they begin to experience a condition known as musth. The phenomenon of musth was first described in captive Asian elephants and though physiologically well explained, its role in the ecology of elephants was not understood for a long time. The period of musth may last from a few days to more than three months, depending on the age of animal and its body condition. The body condition of bulls coming into musth is usually very good. Studies have shown that during musth level of the male hormone, testosterone, go up and bulls usually range far and wide in search of females in estrous. Some researchers have compared musth with rutting. Musth bulls are usually very aggressive towards other bulls and guard estrous females very vigorously. Bulls not in musth are also known to mate successfully but the urge to search for females in estrous is very strong in musth males.

One morning in Dhikala, while driving to the chaur, we saw a 25-year-old bull standing nervously at the edge of a forest. We stopped the vehicle and watched him. After a minute or so he started running into the chaur. The reason became apparent when we saw another bull about 30 to 35 years old, in musth with thick short tusks. He was walking threateningly from the forest edge towards the younger bull which beat a hasty retreat from the area into the chaur. When we followed the musth bull, we found him courting a female. The other members of the group were mostly hidden by the vegetation. A little later, loud vocalizations in the form of rumblings and squeals and trumpets were heard. We grabbed our binoculars and started to scan the group. The musth male had mounted the female and was mating with her. After about 40 seconds, he dismounted and we again could hear exited vocalizations. We quickly hurried over to the group and took a good look at the musth male. He was in very good physical condition. He kept very close to the female and guarded her throughout the three days we watched him. During our observations we saw the musth bull chasing at least eight different adult bulls of varying ages

from his vicinity.
Four years ago, one winter evening, we were on the trail of a large radio-collared bull elephant in the Chilla part of Rajaji National Park. He was a massive animal over 10 feet high and little over five tons in weight. We fondly called that 46 year old bull, 'Big Boss' finally, when we located him, he was with a cow group vigorously courting female. Musth profusely flowed down both his cheeks. A cow elephant comes into estrous only for two or three days in a year and if it conceives may not cycle again for two or three years. This means that very few cows may be in estrous at a given time. For a long time researchers were wondering how adult bulls, especially ones in musth, find females in estrous. Catherine Payne and her colleagues, while working on infrasound communication by elephants in Etosha National Park Namibia, discovered that females in estrous give a peculiar call, inaudible to humans. They have speculated that elephant bulls 'hear' this, and are able to home in one female in estrous. During the 3-4 month period when Big Boss was in musth he wandered over an area of about 200 km^2 and during this period we located him with eight different female groups. What he was doing was obvious – roaming in his home range looking for receptive females. By the time the winter coolness had given way to summer heat, his body condition declined, he lost his great urge for sex and became solitary.

Dr. Justus Joshua, a researcher from the Wildlife Institute of India, then studying elephants in Rajaji Park, observed a great contraction in the home range of Big Boss – from 200 km^2 in winter to about 20 km^2 in summer. There was a total change in the behavior of the elephant too. In summer Big Boss spent the whole day resting in a cool valley far away from any form of human disturbance. He stirred out of his hide only after darkness had descended. Thereafter, he went to a small water hole in the dry river bed, dug out by gujjars, and drank his fill. This took almost an hour. He also threw water on his body several times to cool himself. Thereafter he disappeared into the forest to feed, largely on the bark and branches of the trees which he pushed down effortlessly.

Early one morning, when Justus tracked down Big Boss, the bull was still feeding and there was a cow group with him. Interestingly when Big Boss debarked and pushed down a tree the entire group gathered around and started feeding on the tree, leaving very little space for Big Boss. This made him move away and find another tree to debark and push down. Possibly to the consternation of Big Boss even this tree was taken over by the group. Then it occurred to Justus that one of the reasons for Big Boss leading a solitary life in summer (the major reason was lack of sexual desire) could be to avoid competition with cow groups over food trees which are hard to come by in a degraded and heavily disturbed habitat like Chilla.

We have quantified debarking by elephants in Rajaji National Park and Corbett Tiger Reserve. Debarking begins in winter and reaches it's maximum in summer. Summer in most elephant ranges is characterized by a lack of forage and water. This is also the time when the elephants suffer from a lack of calcium in their diet. This makes them debark and feed on cambium, the internal tissue of the bark, along with which plant sap rich in calcium flows from the root system to the canopy. Interestingly, debarking is much more common in Rajaji National Park than in Corbett Tiger Reserve. We attribute this to the immense biotic pressures, like wood cutting, lopping and cattle grazing, which have led to severe degradation of the habitat in most places. The reason for the area around Dhikala not having many incidents of debarking is due to

the rich forage that the Ramganga Valley offers even in summer. The streams, rivers and the soil around Dhikala may be richer in calcium than in Rajaji National park, this however, needs to be studied.

The tragic end of Big Boss reminds us that all good and bad things in life should come to an end. In November 1995, the 50 year old Big Boss came into musth and he followed a young female who was in estrous and in the company of a large herd. According to the wildlife guards the herd had about 60 elephants and there were 3-4 bulls with the herd. On the eventful day, when Big Boss courted the female, the other bulls joined together and attacked him. The fight raged over the river beds and hills, through forests and open areas. The guards tried to disperse the bulls by firing in the air but their efforts were in vain. Big Boss fought valiantly but the fight was uneven. In one place, Big Boss, who should have been extremely tired by this time, slipped and fell into a narrow nallah from where he could not get up. This made him totally vulnerable to his attackers, and exploiting his hapless situation, one bull, which was in prime and had dagger –like tusks, gored him to death. Thus ended the life of a magnificent and noble bull (he had allowed us to approach him very closely on several occasions) who strolled through the Chilla forests in all his majesty for more than two decades.

The elephant bulls of Corbett Tiger Reserve and the adjoining areas are a peerless asset, which need to be assiduously protected for ecological and aesthetic reasons. The sight of magnificent bulls, strolling across the Dhikala chaur giving the impression that they are lords of the Reserve and afraid of none, can thrill any visitor. Their trumpets and fights, both mock and real, can bring a vision of a primordial world to an observer when woolly mamoths roamed over the land and man was a hunter and as well as prey.

Much needs to be done to ensure the future of these bulls. Effective protection should be continued. Corridors across the Ganges and Khoh rivers should be strengthened so that the bulls can continue to pass on genes from one population to the other. Corbett Tiger Reserve should be expanded to stretch between the Kotdwar-Lansdowne road in the west to the Nainital-Kaladhungi road in the east. This vast stretch of prime tiger and elephant habitat should be freed of human disturbances, as much as possible, which will benefit all forms of wildlife.

Prior to 1993, gujjar buffalos roamed over the banks of Palain river in Halduparao range and their presence made large wild mammals shy away from the area. But the immense wildlife potential of the area was realized by Shri A.S. Negi, IFS, former Director of Corbett Tiger Reserve. In February 1993, by persuading the gujjars to move to another area, he freed Halduparao from gujjars. The results were remarkable. When we visited Halduparao in May 1995, a herd of elephants trailed by a massive bull, was feeding peacefully. Numerous sambar were seen in the nearby Mandalti sot which was once an abode of buffaloes. Tiger signs were numerous in the sot. Such farsighted conservation measures needed to be taken all over the Rajaji-Corbett elephant range, where human disturbances destroy critical wildlife habitats. Fortunately several conservation agencies like the newly formed "Operation Eye of the Tiger" and "Corbett Foundation" are willing to help solve the problems of the Reserve. If suitable conservation measures are implemented in the field, the future of the awe-inspiring bulls and other wildlife of the area can be safe-guarded for several more decades.

A Success Story of Rellocation of 3 villages from Corbett Tiger Reserve

**A. S. Negi*

Geographical Location and Brief History

Corbett National Park is the first National Park of the Indian Sub continent established on 8th Aug. 1936 under U.P National Park Act of 1934 (An act specially enacted for this particular purpose). Dhikala and Boxar Chaurs (grassland) which are now in the core of the National Park were freed from agriculture and cattle as far back as 1861-62. In 1868 the area was handed over to Forest Department for management and it was declared as Reserved Forest in 1871. The idea of establishing a Wildlife Sanctuary in this area was first floated by Sir Michel Keen on 3rd Jan. 1907. Sir Malcolm Helley the then Governor General of United Provinces proposed this area for Wildlife Sanctuary in 1934.

Initially the Park was 323.75 km^2 which was extended to 520.82 km^2 in 1966. Timber Opetations were stopped in a radius of 5 km. around Dhikala in 1971-72. In 1975 after the filling for Ramganga Reservoir was completed, timber operations were completely banned in the National Park. Fishing as a sport was banned in 1987.

The ambitious conservation project-'Project Tiger' was inaugurated in Corbett National Park on 1st April 1773 and at that time it was coterminous with the Corbett National Park boundaries.

On 11th June 1991, Sonanadi Wildlife Sanctuary (301 km^2) remaining part of Kalagarh Forest Division and adjoining portions of Ramnagar and Tarai West Forest Division (497 km^2) were brought under the management of Director, project Tiger

Background of Relocation of Village

When agriculture and cattle camps were shifted in 1861-62 from Dhikala and Boxar Chaurs, perhaps these people were settled on the *Kandi* road now forming the southern boundary of the Corbett National Park. Dhara, Jhirna and Kothirao villages must have come in existence around that point of time. *kandi* road formed the geographical boundarry of hills with the plains. When boundary of Corbett National Park was delineated under the guidance of Jim Corbett, care was exercised to keep these villages outside the boundary of National Park to avoid inconvenience to their inhabitants.

The Tarai Bhabar area south of *Kandi* road was then densely forested and there was mixture of grassland and miscellaneous forests in Tarai area whereas Bhabar area had dense growth of Sal dominated forests. Settlements in Tarai Bhabar area were then avoided due to damp and malarial climate and there was presence of excessive population of wild animals specially tigers and elephants.

Post independence period brought large populations of Sikhs from Pakistan some of whom were allowed to be settled in Tarai area of Uttar Pradesh. Extensive deforestation took place and large chunks of wildlife habitat specially that of tigers and elephants were converted into agricultural land. The post independence development efforts brought roads,

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Relocation site of Jhirna village taken over by Wild animals
Photo : A. S. Negi

After Relocation of village, Anti poaching camp was set up at Kothirao
Photo : A. S. Negi

electricity, education and other facilities in these areas.

It was at this point of time when inhabitants of villages like Dhara, Jhirna and Kothirao (Garhwal) and Laldhang (Nainital) in the south of Corbett National Park and Taria and Kanda (Garhwal) in the north of Corbett National Park started feeling inconvenience due to the presence of dense forests all around them. Their development could not keep pace with villages in Tarai, which had come up much later. The formation of National Park and conservation of flora and fauna only added more difficulty for them as their agricultural crops were raided and incidents of man-animal conflicts increased substantially.

The first request for relocation to an area close to Kalagarh Dam colony was made by some villagers of Dhara, Jhirna and Kothirao in 1973. The Village Panchayat of these villages passed a resolution in favour of relocation on 18.9.1976. The Govt. of U.P. constituted a committee of local MLA, DFO, Tarai West Forest Division and Field Director of Corbett Tiger Reserve in July 1977. Conservator of Forests, Western Circle was later co-opted in the committee. Relocation of village Taria on northern boundary of Corbett National Park was also proposed but the villagers did not agree for the relocation and it was dropped on their request. Later in 1978 villagers of Laldhang village of Nainital district close to Kothirao village, also requested for inclusion in the relocation scheme, which was agreed.

In a high level meeting held on 29.4.79 and headed by Addl. Chief Conservator of Forests (Kumaon) and attended by concerning MLAs of Garhwal and Nainital districts, Field Director, Corbett Tiger Reserve, DFO, Tarai West Forest Division and Pradhans of the concerned villages, it was decided that the relocation package will include exchange of private land with equal land at new site and no extra land would be given for community purposes and also no land would be given in exchange of encroached land . Initially Guljarpur Forest Block was proposed but later Ampokhara block of Tarai West Forest Division was proposed, which was approved by Govt. of India in 1982.

It was later felt at UP State Govt. level in 1982 that dense forests of Ampokhara block would be sacrificed, so some other site with less vegetation should be selectedd. This decision was taken in a meeting held on 30th June 1982 under the Forest Secretary, U.P. Finally Ampokhara (part), Manpur-Firozpur and Pratap Pur blocks of Tarai West Forest Division were proposed.

All the 4 villages wanted to settle in Ampokhara Forest Block due to its nearness to main road and proximity to Ramnagar town. This led to delay in approval of the proposal by Govt. of India.

I took over as Field Director of Corbett Tiger Reserve in Nov.1989. I was approached by one gentleman Mr. Jashwant Singh of village Jhirna, who had been working hard to get an approval from Govt. of India and was running from pillar to post between Delhi, Lucknow and Ramnagar. His main problem was to make the villagers agree to a formula for distribution of land to the 4 villages in the 3 different forest blocks. This led to an impasse, which continued for 8 long years.

The Relocation Process

A meeting of all 4 villages was arranged at Ramnagar on 4th July, 1990, which was attended by a large number of villagers from all these villages. There were serious

differences among villagers regarding allotment of land at new sites and all of them wanted allotment only in Ampokhara Block. With great debate and persuasion of about 7 hours they could arrive at a formula agreeable to all of them. They finally signed the agreed arrangement. In this meeting it was also unanimously agreed that the proposal for Garhwal and Nainital district should be submitted separately. Two proposals were thus submitted to Govt. of India through State Government, One for Dhara, Jhirna and Kothirao villages of Garhwal district and another for Laldhang village of Nainital district.

Mr. Jashwant Singh of Village Jhirna made extra efforts to pursue the matter at Govt. of India level as a result of which proposal for relocating Dhara, Jhirna and Kothirao villages of Garhwal district was approved by Govt. of Indian in May and July 1992. Govt. of U.P. issued sanction in Nov. 1992. After the sanction, villagers of these three villages were apprehensive about just and equitable distribution of land at new site among different individuals. They had reservation from Revenue officials. They also had differences about allocation of land in different Forest Blocks to different villages or group of families from these villages. I was asked to intervene at every stage. Series of meetings with villagers almost one meeting every month had to be called to sort-out the differences. A large number of people were absentee landlords but once they came to know that the matter of allotment of land close to a highway and near Ramnagar/Kashipur towns was about to mature they also became active and started exerting their influence to get land at best place. This added fuel to the fire. I had always been advising them to sort-out matters among themselves and not allow intervention of Govt. departments. Though help of Revenue Surveyors was sought but the actual distribution of Forest Blocks and individual holding in a particular Block was done by villagers themselves. This process made a fair and just distribution of land among the villagers and they finally moved on to the new site in May 1994, which coincided with my transfer from Corbett Tiger Reserve (In June 1994). The proposal of Laldhang village of Nainital district had some technical difficulty due to presence of some so called landless people and the matter remained pending at the Govt. of India level for another almost 6 years.

Relocation package

As mentioned earlier, the villagers had initially agreed for exchange of equal land and at that time no other facilities were demanded nor the State Govt. had made any commitment. Meanwhile, relocation of villages had taken place in Kanha Tiger Reserve in M.P. and some other places where Govt. of India had offered some package for relocation of tribal villages from Tiger Reserves. Govt. of India was initially reluctant to give any financial help for these non-tribal villages but on strong pleading by the Field Director it was finally agreed to offer the same package to them, which was offered for tribal villages.
Each family was grated Rs. 10,000/- for construction of a hut, Rs. 1,000/- for transportation of household goods and Rs. 2,000/- per hectare for leveling of land at new site. Funds were provided for drinking water (Rs. 50,000/- per village), approach road (3 km @ Rs. 25,000/- per km) and cattle pond (Rs. 30,000/- per village). At local level the Field Director, Project Tiger arranged land leveling with the help of departmental D-4 tractors, which helped the allotees to take possession quickly.

The quantum of Relocation

Nameof Village	No.of families	Human population	Cattle population	Land involved (hectare)
Dhara	85	930	1100	90.205
Jhirna	137	1250	1400	97.028
Kothirao	78	800	1000	29.487
Total	**300**	**2980**	**3500**	**216.720 (+5.055 Patta land)**

Land Allotted at New Place

Name of Forest Block	Area (in ha.)
Ampokhara Forest Block	98.344
Partap Pur Forest Block	16.590
Manpur firozpur Forest Block	106.700
	221.634

Relocation of village Laldhang in Nainital District which was originally proposed with above villages got delayed at Govt. of India level and final clearance was received sometime in early 2000. Laldhang Village had following demographic figures:

No. of families	Human population	Cattle Population	Land involved (ha.)
111	1100	1300	184.846

Due to an ongoing World Bank aided project the relocation could not be possible immediately and this lingered on for sometime. Finally, majority of the families did move to the new site in 2001 but about 18 families with land holdings and about 12 families of so called landless people have not moved out so far and the very purpose of relocation has been defeated both for the people and for the Tiger Reserve. These families are now trying to encroach upon the land left behind by the relocated families. These people who are reluctant to move out try to make living by illegal cutting of Bhabar grass and bamboo and removing huge quantities of fuel wood from the Tiger Reserve for making Khoya from the cattle milk. Their intention is also to encroach on the leftover land of people who have already moved out and there is all likelihood of these people inviting outsiders in the name of eco tourism.

Social and Economic Condition at New location

The social and economic status of the relocated families has improved tremendously. They are now close to the developed township of Ramnagar and Kashipur and the fertility of land is several times better. Irrigation facilities have been developed and pucca houses have been constructed by majority of them. They no more keep unproductive cattle. They are on a State highway. Their products have ready market. Many have electricity and telephone facility. Schooling of children

has become easy and most of the people are now sending their children to schools and colleges. They have started keeping improved variety of cattle and practice modern agriculture. There is very little or no conflict with wild animals. A revolution has come in their economic and social condition within a very short span of time. Many of the absentee landlords of the original site have become active farmers.

Though the status of their land is no more that of a Reserve Forest but Hon'ble Supreme Court of India has put certain conditions, such as, prohibition of transfer of land for the next 50 years except by way of succession and prohibition in change of land use pattern. This may be in the general interest of the people to prevent agricultural land being diverted for colonization, industries and hotel and resort business. These activities are likely to convert many people particularly those with smaller holdings into landless category and eventually make them destitute and slum dwellers.

The Restored Habitat

About 273 ha. of land was restored back as prime tiger habitat in 3 separate patches. They are being managed as Chaurs (grassland) for the prey species. These sites are now prime wildlife habitat with large herds of cheetal grazing on them. One can hear alarm calls of Cheetal, Sambar and Peacock from Jhirna Forest Rest House. Each site has been taken over by the territorial male tigers under their control. Elephants roam around without causing conflict with humans. Scores of pea pheasants keep searching for their food on these patches. The bird life, butterflies dragon flies and scores of night dwellers now use this area without disturbance.

The Lessons Learnt

(i)Relocation of villages has generally been regarded as social problem but in this case even the initial initiation was made by the villagers themselves and their elected representatives were always actively associated with the demand of villagers. The involvement of villagers and their elected representatives made the successful relocation possible.

(ii)The cause of relocation was beneficial both to the people and to the wildlife. In fact relocation was being advocated for the benefit of both of them right from the time of handing over of the forest to Forest Department. The idea of disturbance free habitat for wild animals was mooted as far back as 1861-62, when habitation from Dhikala and Boxar chaurs were shifted. This helped in creating the first National Park in the Indian Sub-continent about 67 years back and maintain it in prime condition till now. The sacrifice of few people at that time has gone a long way in the conservation history of our country.

(iii)The villagers need constant guidance and night kind of intervention from Govt. agency in order to make successful relocation possible. Sorting out of internal differences among themselves and deciding about land allotment process among themselves also helps fair allotment and satisfaction among villagers.

(iv)Relocation process has to be flawless or the situation like that of Laldhang Village will emerge whereby in-spite of majority of villagers having been moved, the site still remains occupied by human beings.

(V).The relocated villagers need lot of support and moral back up to establish at the new site. Follow up with district administration for their developmental needs is essential.

A Trip to the Corbett National Park

*S. Gupta

It was on a bright, sunny morning during Holi of March, 1959 that we set out for the Corbett National Park. There were three of us-a retired tea planter, a forest officer, both ardent wild life conservationists, and myself. I was a young tyro in this whole business of wild life, whereas my two companions were veterans who had seen most of their days in north-eastern India. We were heavily loaded in an old Studebaker car of 1948 vintage and had, in addition to a driver, a cook. This was our second attempt to go to Corbett (previously Hailey and still previously Ramganga) National Park, our previous attempt last year at the same time having been frustrated by inability to arrange bungalow accommodation. This time we had taken no chances and the three different authorities to whom one has to write for bungalow and elephant-the D.F.Os. Ramnagar and Kalagarh divisions and the Game Warden, Kotdwara-had been approached well in time.

Our start from Dehra Dun was rather delayed because we had to comply with a request from one of the leading gardeners of the town, who wanted us to see her display of seasonal flowers. We cleared the town eventually and after a pleasant run eastwards through sal forests, we reached Rishikesh. Shortly outside the town we spotted a group of wandering animal trappers, locally called *Sansi*, who were accompanied by several mangy and half-starved pariah dogs and carrying some dead animals. We pulled up at once and asked them to stop. There were three porcupines, a small sized monitor lizard and a very large pangolin or scaly ant-eater. We questioned the men, who were armed with long and stout spears and they told us that they had killed the animals in a nearby forest. They also stated that their services were in demand by the local forest authorities for killing porcupines in their plantation areas. When we asked them why they had killed the pangolin, they had no answer except to say that it made holes in the ground. The monitor lizard was a very poisonous animal, according to them!

Although we were in a hurry, the forest officer, who was incharge of a training institution which had a wild life club and wanted the pangolin for display in his club room, bargained with the men and eventually persuaded them to accept Rs. 20/- for the skin of the animal. We made a start on skinning it by the roadside, but soon gave it up as we realised we were being delayed. The men assured us that they would deliver the skin of the pangolin to the local taxidermist in Dehra Dun and so we went on. We gave them a chit and Rs. 5/- as an advance and promised to pay the balance on our return two days later. They said they were camping on the outskirts of Rishikesh and actually lived in Dehra Dun.

We took a couple of photographs of the extraordinary group, the men lean and bedraggled, with unkept hair falling over their faces, the emaciated dogs sniffing at the carcasses and obviously hungering for their share of the meat. We drove on, discussing the superstitions which are responsible for destruction of so many of India's harmless creatures and the apparent hopelessness of the whole situation. Here were a group of people whose normal avocation was catching and killing any animal (and bird, for that matter) which would yield them food or some gain, operating under the very noses of the local authorities!

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We resolved to report the matter to the Game Warden, which we eventually did and we were later glad to find that the local officers have been asked to put a stop to the killing of pangolins and monitor lizards.

When we reached Hardwar, where we had to cross the Ganges, we had some difficulty in finding our way to the boat-bridge because all sign-boards were written in Hindi. As a result of these delays, we had to halt for lunch at the Chilla forest rest house on the other side of the river, which is a favourite camping place for shikaris and tourists in the Lansdowne division. We had not made much progress so far and we still had a hundred miles to go to reach the Boxar forest rest house, which had been reserved for us.

After a hurried lunch, we started repacking. Suddenly, we discovered that tin of ghee, which the cook had brought along, had spilled in the bag in which he was carrying it. I, who had been appointed by unanimous consent to be in charge of the commissariat on the trip, was naturally furious. My temper did not improve when the cook, commenced to scrape up the spilled ghee with his hand, ladling it into the tin with his open palm in typical style. But I received little encouragement from my companions, who merely poked fun at the situation and laughed at me!

Hurriedly getting into the car, we turned her around and drove straight out of the gate and down what looked to be the obvious road to Laldhang and the Corbett National Park beyond. After going some distance, the road began to deteriorate from the point where it entered a rao or dry river bed. The car soon commenced to take an awful battering on the boulders and ruts in the uneven track. "Surely this could not be the road to the Corbett National Park", we thought. And as our suspicions began to grow into a certainty, we met a couple of Gujar women washing their clothes. On questioning them, they laughed at us. "You are not on the forest road but on an extraction path", they said. 'The road to Laldhang is in the other direction!"Quite exasperated, we turned the car around and went back to the bungalow, only to find that the correct road took off to the east and that we had missed the sign-post in the flurry of leaving the place after the ghee incident! Stopping for a moment to give the driver (allegedly) a chance to 'check' on every thing – a habit of his, as we discovered later, which was only a pretext to smoke a cigarette-we speeded up. We were driving merrily along the road, relieved to be finally on our way, when all of a sudden the car stopped. Thinking it to be the usual air-lock in the fuel pump, the result of the heavily adulterated U.P. petrol, we stopped and opened the bonnet. To our horror we found steam enveloping the engine and the water from the radiator completely drained out through a broken hose-pipe connection. Our first reaction was one of apprehension that the car had seized up, but this eventually proved not to be the case.

We set to work making a make-shift joint with soap, cloth and wire. After emptying all our water into the radiator we pressed on the self-starter and much to our rleief, the car started. But after going about half a mile, the jointed worked loose and all our efforts were in vain. Realising that this might well be the end of our trip if we could not fix the hose-pipe connection, which had worked loose as the result of a poor welding job done some months ago when the radiator core had been changed, we sat down by the roadslide in despair and had a cup of tea. The unfortunate cook was sent back to the nearest steam we had crossed some two miles back for more water, without which we could not move in any case.

By this time evening was approaching, when suddenly an empty truck with a few people in it came along from the opposite direction. To our delight the local D.F.O. turned out to be one of the passengers in the front seat and he could not have been more helpful. After consultation with the driver and handy-man of the truck, it was decided to tow the car back to Chila from where we could send the radiator across to Hardwar, or if necessary to Dehradun, for re-welding. We had, by this time, resigned ourselves to the envitable. Chila, we understood was a good place for wild life. The Belgian Ambassador had passed through that very afternoon to try and secure photographs of elephants, which were reported to drink in the river close to the bunglow. We, however, contented ourselves with a stroll around the place while our luggage was being un-loaded and the radiator was being dismantled. After we had settled down and bathed we chatted with the D.F.O. and had dinner with him. It was very comfortable and cosy in the bungalow, with the Petromaxes hissing. For me, the novelty of camping there, while my two companions were like old war horses back in their natural surroundings.

Early next morning after breakfast we left by the daily bus which plies between Hardwar and Kotdwara, leaving the car behind to be brought on by the driver when the radiator was ready. We had already lost one out of the three precious nights we had allowed ourselves for the trip and so could not delay any longer. On our way to Kotdwara we visited the Mallan Deer Park and Sacntuary. This is constreucted near a temple, which is an attraction for the local people and the local forest department authorities had made a good job of it. There were some very nice houses for tourists and three very tame, deer, including a sambhar. We learnt that a leopard had broken into the park by burrowing under the wire and had scragged one of the deer. It had luckily not been worse and the forest dept. were constructing a long, rubble-masonary wall all round the base of the fencing wire in order to prevent a recurrence of this. But they had forgotten the overhanging trees, which my experienced companions pointed out to them, urging them to remove all trees standing near the wire fence, as leopards could easily climb up and drop into tne enclosure.

We reached Kotdwara in the afternoon and were welcomed by a visiting Conservator of Forests, who was an old friend of one of us and who happened to camping there. After a sumptuopus tea, he arranged a jeep for us and we set out on the last leg of the journey when it was almost dark. Our car had arrived while we were having tea and transferring our luggage from it we left it behind, as the road ahead was not fit for vehicles of this type. We never imagined, however, that the road could be so extremely rough. It cut right through the Siwaliks to the patli Doon, which constitutes the Corbett National Park and how vehicles were playing in two-way traffic on this road was amazing. The road twisted and turned like a serpent, rising and falling all the while with a very bad surface and the driver did not improve matters by driving fast.

However, we reached Boxar without further incident at about 9 P.M. and unpacking we proceeded to settle down for the night. I went in the jeep to alert the Game Warden, who was camping a few miles away at Paterpani. We then rather reluctantly allowed it to go back to Kotdwara, as the driver was obviously keen on getting back for his Holi fun. It was a delightful, cool moonlit night and we slept well fortified by a couple of rums. I had gone in the jeep to meet the Game Warden and on the road had been a large herd of cheetal feeding in

the grass not very far from the bunglow. This had whetted our appetite with the prospect of seeing plenty of animals the next day and taking photographs.

Early next morning after just a cup of tea we set out in the Game Warden's pick-up, which he had sent from Paterpani the previous night, to meet the elephant which was to take us around the park. The country looked very suitable for game and we were all eyed up. Close to the spot where the elephant met us, there was a machan built by the side of the road and we were shown the stake at which over 20 baits of young buffaloes had been tied for tiger by a film unit of the U.P. Government, which had recently been in the locality for filming wild life. The place was littered with skulls and bones and my companions marvelled at the open space in which the baits had been tied. They were not at all surprised to learn that the tigers had not been obliging enough for being photographed by daylight, though from the abundant pugmarks all round the machan and in the river bed there must have been several very well fed tigers lying up somewhere close.

Mounting the elephant we set out to look for them. Crossing and recrossing the mullah and occasionally going through high grass, we suddenly heard the whoof of a tiger in some high grass across the stream. Immediately everyone got most excited and I, who was sitting near the tail of the elephant, nearly fell off as the mahout swung her around! The cameras were hurriedly got ready and we started circling to locate the tiger. Four people on a paid (for the driver had also come with us) is far too many for successful manoeuvering of this nature and it was no wonder the tiger escaped in the rather confused efforts to find him. My companions assured me that he was a very cunning tiger, as he had slipped away without showing any indication of his presence except that first whoof of obvious disapproval at our encroachment on his domain. "Tigers" they said, "either bound away in the grass or sneak away very quietly in this fashion. They also sometimes 'stayed-put' and for all we knew, we might have passed him in the long grass.

Still speculating as how the tiger had got away without giving us a glimpse of him, we went on. Suddenly within a short distance, we saw a solitary wild tusker elephant feeding on the edge of the jungle on the other bank of the stream. As we approached him, he became aware of our presence and turned around and faced us. We then saw that he was in full 'musth', his cheeks stained with oily fluid which was exuding from his temples. He was not at all afraid of us but on the contrary came forward in a challenging manner. When we had approached him close enough we stopped and the two cameras with us got busy.
All the while the wild elephant kept on coming roward, occasionally stopping and shaking his head and taking our scent with his up-raised trunk. I was just beginning to panic and the mahout was also obviously getting nervous, when by a coincidence the cameramen had their fill of photographing him at the same time! Though there was the stream bed and the high bank on which the elephant was standing between us, to me it seemed a perilous situation. We turned away intending to make a detour to avoid the elephant and the last we saw of him was his up-raised trunk questing us, as he kept on coming forward. I felt that we had left the spot in the nick of time. The mahout suddenly discovered that this was, after all, not the shortest route to Paterpani and that the motor road was the best and cloest way to get there! Chaffing him, but making allowance for his natural reluctance to take our elephant into possible danger, we turned back and rejoining the road, and eventually got to Paterpani,

where the Game Warden met us. He was not all all surprised at our encounter with the elephant and said that there were many elephants and tigers around his camp and that every night he heard noises quite close to the bungalow. As for tigers, he said that they made a practicie of roaring every evening within a few hundred yards of the bungalow!

After a cup of tea, we went back in his pick-up to Boxar where we had our lunch and some rest. In the evening we set out for Paterpani again and now we decided to split up. I sat on the elephant while one of my companions climbed into a machan, or watch tower, built in an open space some distance away from the bunglow, and the other went somewhere with the Game Warden. We saw some wild pigs only. On turning back towards the machan where we had arranged to meet, we learnt that an elephant had passed the machan and within a few yards of it, offering excellent opportunities for photography. The other member of the party just then returned with the Game Warden and he immediately went off with his camera and telephoto lens on the track of the elephant, which had gone towards the same forest on the high bank, through some high grass.

He had an interesting game of hide and seeks with the elephant, which on hearing him approach, hid itself in a hollow in the high bank behind some trees. We had a grass-stand view from the machan of him dodging about and retreating backwards when the elephant started coming out, suspicious and taking the scent from the ground of the human foot-steps. The sun was sinking and the elephant, which was covered with red dust which he had thrown on himself in the river bed, was a fine sight, according to the photographer. It was a youngish elephant, though powerfully made, and had small tusks. He told us that his hiding himself in the manner in which he did, may have been due to timidity but that is the way in which he eventually came out, silently and cautiously, and the manner in which he kept on tracking by taking the scent of the footprints, indicated that he was a cunning animal and potentially dangerous. Unfortunately, owing to a defect in the camera, few of the pictures taken of this elephant came out successfully.

By this time it was dark and we had to call it a day. After another cup of tea with the Game Warden, we went back to Boxar. On our return journey we drove along some of the roads and saw in the head-lights of the car two large herds of cheetal, numbering about 50 to 70 each. We stopped the car and kept the light on and counted them as they crossed the road. I had never seen so many deer in my life and was terribly thrilled. It was sad to think that these grazing grounds of the cheetal and hog-deer would one day be inundakted by the waters of the Ramganga lake, which would be created by the dam which is contemplated by the U.P. Government in the Ramganga george, where it debouches through the Siwaliks into the plains.

After another very pleasant night in the Boxar, we got up early intending to go to Dhikala and then drive on to Kotdwara by the regular or upper route. While the cook was giving us breakfast, he said that he had seen a tiger when he had come out to relieve himself in the early hours of morning. "It was standing under the tree", he said, "and both of us rushed in the opposite direction. The tiger made off into the high grass outside the bunglow with a grunt and I into the kitchen, where I locked myself in!" When I cheked the commissariat later on, I found that all the tea, sugar and milk had been exhausted and the driver said that the cook had been drinking it all night a clear case of 'cause and effect', whichever way you look

at it!

We were ready before the sun rose and getting into the Game Warden's pick-up, we drove to Dhikala cross the level flats of the Ramganga which lie on either side of the river. Dhikala is situated on the highest of these flats and we were told that this would be the only area which would not be submerged by the lake. Even so, this would be a small part of the original area available for the cheetal, hog dear and pig now grazing here, and the effect on the large numbers of these animals of such a drastic reduction in their grazing areas can well be imagined.

At Dhikala we ran into comparative civilization again: sleek American cars of Delhi tourists enjoying the beauty of the scenery and the jungles, finely built and appointed bungalows for tourists etc. There were guides and there were elephants for taking the people around in fact this were the nearest approach to a 'dude' camp of the American vairety which I could imagine. We were told that extraordinary luck sometimes attends the visitors who go out on elephants or in cars to see game. On one occasion, whole bus-load of children had witnessed a tiger stalking cheetal deer. On another ocasion a couple of sportsmen had followed a tiger on an elephant for a long time. All this made us more regretful than ever at having missed seeing the tiger we had put up the previous day at Paterpani.

What came in for our criticism at Dhikala, was the artificial manner in which the look out towers had been built. One of us had, earlier in the morning, climbed into one of these towards in an attempt to photograph the herds of cheetal which were grazing around while the others had tried to round up these deer and move them towards the tower. But we had had no success. It must have been quite obvious to even the most self respecting cheetal deer that the towers implied some danger. Surely they could have been camouflaged to some extent or hidden in the groups of trees, instead of standing them out in the open, like tall water-towers for everybody to see from almost a mile away!

We left Dhikala after eating our sandwiches and chatting with the local Range Officer in his quarters. After an interesting run over the long upper road which winds over the Siwaliks through some very interesting country, we reached Kotdwara, where after another sumptuous tea at the hands of the Conservaotr and his wife, we loaded our car and set out for Dehradun.

All of us had to be back at work the next day and although we would have loved to have had another day or two in the Corbett National Park, for our appetitite had been whetted by what little we had seen and there was always that elusive tiger which one was hoping to see, we had to leave.On our return journey, although we drove through the forest late in the evening we saw only a few pigs. It was quite late when we reached Rishikesh and there was a storm brewing. But we stopped near the twon to locate the camp of the Sansis. They were living in some miserable hovels by the side of the road but their mongrel dogs were very alert. We paid for the pangolin, after getting an assurance that it had been delivered, and drove on to Dehradun, which we reached at midnight. So ended a most interesting and for me an exciting, visit to the Corbett National Park.

Management of Rajaji-Corbett Need for an integrated planning

*A.S. Negi

1. General

The biggest problem facing management of habitats in India is to keep a balance between development and conservation. There is a strong lobby right from the local to the national level advocating fast development of infrastructures and urbanization supported by commercial interests and only a handful of people are raising concerns about conservation issues. The people raising conservation issues are generally not welcome and their voice is dimmed by powerful people in politics, administration, business and media. The development like roads, railways lines, canals, expanding industries, urbanization, pressures of both human and cattle population are increasing very fast. All this is leading to habitat fragmentation and problems of connectivity between adjacent habitats.

The most glaring example is that of the Tarai forests in the foothills of Himalayas in India and Nepal. Almost 50 years ago there was a 1600 km. long necklace of rich forests and grasslands stretching along outer reaches of Himalayas straddling the India/Nepal boarder. This stretch better known as Tarai Arc is today fragmented into small habitats in both the countries and no single reserve is large enough to maintain a viable population of large mammals like elephants and tigers without the opportunity for them to disperse from one refuse to another.

Looking back into the habitat and distribution of tigers and Asian elephants in its range globally, it is evident how these important charismatic mammals have shrunk to population levels which are causing concerns for their very survival. Three of the 8 sub species of tigers are already extinct from the outer margins of Tiger range. Fourth sub-species, the south China Tiger has shrunk to a critical level. The remaining populations are also badly fragmented and isolated. The situation of Asian elephants is no better.

Rajaji-Corbett is the North-Western limit of tigers and Asian elephants. This has been classified as Tiger Conservation Unit (TCU) No. 1 by Tiger experts. On the basis of indices for habitat integrity, poaching pressure and population status the TCUs have been ranked as level I, II and III all over the tiger range in the decreasing order of their importance and Rajaji Corbett has been ranked as level I TCU.

Past History

Rajaji-Corbett was part of contiguous Tarai Arc Landscape extending from river Sarda bordering Nepal in the East to river Yamuna Bordering H.P. in the West. It has rich Sal forests with patches of mixed forests, riverine forests and grasslands. Due to its rich bio-diversity and presence of rich wildlife, Corbett N.P. was created in 1936, which was later extended. Rajaji was created out of Chilla, Motichur and Rajaji Sanctuaries in 1983 and Sonanadi Sanctuary was created in 1987. The approximate area in early fifties was over 7000 sq.km of contiguous forest. Just after independence large chunks

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of Tarai grasslands and mixed forests were cultivated by people displaced from Pakistan and a large habitat was lost to agriculture.

In sixties there was a move to replace forest grasslands and mixed forests into monoculture eucalyptus and poplar plantations and later on teak was also planted. Four mechanized plantation divisions were created and by late eighties more than 1000 km^2 mixed forest was converted into monoculture. The area was leased out for agricultural crops along with raising of splantations which further degraded the habitat and depleted the wildlife.

In 1991 about 800 km^2 of buffer area was added to the Corbett National Park and brought under the intensive wildlife management of Corbett Tiger Reserve. In 1994, three villages were relocated from the southern boundary of Corbett Tiger Reserve and about 200 ha area returned to the prime habitat. The experiment was extremely successful. Few of the monoculture plantations in the buffer were replaced by mixed plantations and agriculture leases were stopped in the buffer area brought under the control of Corbett Tiger Reserve.

Some prime wildlife habitats rich in bio-diversity still remain outside and are not being managed properly from wildlife point of view such areas are Kotari (including Kolhu chaur area), Dogadda and Laldhang Range of Lansdown FD, Nandhaur Valley of Haldwani FD, Sitabani-Kota bag area of Ramnagar FD, Lansdown FD and Chiriyapur and Shyampur Ranges of Hardwar FD. These areas are important as corridors and connectivity between Prime Wild Life habitats.

The creation of new State of Uttaranchal has reduced about 32 km^2 area of the buffer of Corbett Tiger Reserve in the southern part from its management and is now part of Bijnor Forest Division of U.P. Entire Bijnor Plantation Division forming part of the buffer of Sonnadi Sanctuary is also no more within Uttaranchal. Shivalik Forest Division close to Rajaji National Park is also now part of U.P. The sensitivity along southern boundary of Corbett Tiger Reserve and Rajaji National Park has increased due to problem associated with interstate boundary.

Present Status

Rajaji Corbett Landscape has now following categories of forest areas:

1. Protected Area	1. Corbett NP- 521 km^2 2. Sonanadi WLS – 301 km^2 3. Rajaji NP - 820 km^2 **Total - 1642 km^2**
2. Area Managed as buffer of above PAs	1. Buffer of CNP and Sonanadi WLS under CTR management **= 464 km^2** (since 1991)
3.Area managed under normal Working plans of Forest Divisions	1.Part of S.PithoragarhFD-50km^2 2. Haldwani Forest Div.–800 km^2 3. Ramnagar Forest Div.- 500 km^2 4. Part of Hardwar Forest Div. - 50 km^2

	5. Dehradun Forest Div. –	400 km^2
	6. Shipuri Range of Narendra Nagar FD -	50 km^2
	7. Lansdowne Forest Div. –	400 km^2
	Total -	**2250 km^2**
4. Areas manged under monoculture plantations	1. Tarai East Forest Div.	500 km^2
	2. Tarai Central Forest Div.	400 km^2
	3. Tarai West Forest Div.	400 km^2
	4. Part of Hardwar Forest Div.	50 km^2
	Total -	**1350 km^2**
5. Area now falling in U.P.	1. Bijnor Forest Div.including areas close to CTR	500 km^2
	2. Shivalik Forest Div.	350 km^2
	Total -	**850 km^2**

The above areas have now been fragmented in several smaller isolated blocks, some of them no more viable for tigers & elephants. During a recent survey of presence & absence of tigers conducted by Operation Eye of the Tiger – India (Dehradun based NGO) it was found that the tiger was absent from Shivalik, part of Dehradun, Shivpuri range, Bijnor division & part of Hardwar division.

The Bottlenecks

1. Large forest areas in Nepal across Sarda river have been clear felled and converted into agriculture Land & human habitation.
2. Haldwani – Kathgodam area has overgrown, there is heavy mining activity in Gola river and there is no connectivity between areas East and West of Gola river.
3. Due to several resorts coming up along the right bank of Kosi, the connectivity for elephants is becoming critical.
4. Due to overgrowth of Kotdwar town and increased traffic on Kotdwar-Pauri road the connectivity has become critical for elephants on either side of Khoh river.
5. There is hardly any connectivity across river Ganga at Hardwar. There has been a long drawn struggle for this small corridor-due to apathy of Army towards this sensitive issue of conservation importance, without any success so far.

Possible Solutions

The ideal solution for such a landscape as far as management of large mammals such as Asian elephants and tigers is concerned would require following.

(a) Landscape planning and management including management of existing forest Divisions outside PAs.

(b) Checking further habitat disintegration and degradation and establishing some

vital corridors & connectivity on priority basis.

(c) Checking poaching and illicit felling

(d) Awareness building & eco development measures.

Looking at the present scenario, we have not been doing anything like landscape planning of habitats. There are two set of criteria of management, one for PAs and other for RFs. Even among PAs we have separate management plans for each PA and there is no scope for their integration at landscape level because in between there are RFs managed under separate sets of working plans. The working plans are prepared for different FDs for different periods and each working plan is independent. It does not look into the problems at landscape level. The working plans of Forest Divisions do not have proper prescriptions for wildlife management or habitat management. Due to lack of integrated approach in habitat management the following difficulties are being faced:

1. Individualistic approach towards cases related to transfer of forest land for development works, resulting in loss of connectivity and habitat disintegration.
2. Continuous patches of monoculture forest crops leading to loss of fodder and pray and finally causing human, wildlife conflicts.
3. Acceleration of man-animal conflicts.
4. Isolated approach to Gujar resettlement leading to delays and ultimate destruction of habitat.
5. Lack of vision for management of large mammals such as elephants and tigers.
6. Lack of funds for planning at landscape levels.
7. Lack of research and monitoring at Landscape level.

It is therefore most essential to have landscape planning and management as far as wildlife and their habitats are concerned. Following steps are immediately needed.

A. At Landscape Level:

(i) Preparation of a broad landscape vision plan.

(ii)Guidelines for preparation of working plans and management plans on a landscape level.

(iii)Restoration of corridors and connectivity.

(iv)Identification of rich biodiversity areas and managing them as mini cores.

(v)Coordination with neighboring state/country.

(vi)Involving international and national funding agencies.

(vii)Relocation or resettlement plan for Gujars or any other people wanting to settle away from PAs and RFs.

(viii)Dealing of forest land transfer cases at landscape level.

(ix)Management plans for elephants and tigers.

(x)Research and monitoring.

(xi)Protection measures such as revival of wildlife regions for checking poaching.

B. At Local, Divisional or PA Level

(i) Critical review of working/management plans.

(ii)Prescriptions for conversion of part of monoculture forest plantations into miscellaneous eco friendly habitat with local species in such a way that fodder and prey availability increases.

(iii)Identification of mini core areas in various forest Divisions.
Examples – Kolhuchaur in Lansdowne Forest Division
- Sitabani in Ramnagar Forest Division.
- Kaldhunga – Ladhiya Valley in South Pithoragarh Forest Division.
- Nanddhaur valley in Haldwani Forest Division.
- Part of Shyampur Range adjoining Rajaji NP in Hardwar Division.

(iv) Conservation friendly prescription in these mini core areas in the WPs of respective Forest Divisions.
(v) Orientation and training of field staff of non-PAs in wildlife.
(vi) Special attention on wildlife protection in mini cores and other important wildlife areas.
(vii) Coordination with nearest Forest Division or PA for corridor restoration and management.
(viii) Coordination with wildlife regional staff at local level and Chief Wildlife Warden at State level.
(ix)Efforts for mitigation of damages by wildlife.
(x)Plantation of wild fruit trees in the regular plantations and non-removal of these trees during felling operations.
(xi)Arrange visit of Forest Division field staff in nearby PAs.
(xii)Creation of waterholes and viewing machans at appropriate places in RFs-specially the mini core areas.
(xiii)Motivate Gujjars to settle outside RFs and help in resettlement process as and when required.
Rajaji-Corbett is synonymous to the important North-Western habitat of elephants and tigers in India which extends from Sarda in East to Yamuna in the West. With prestigious PAs such as Corbett and Rajaji it would not be difficult to illicit support for restoration of integrity of this important and critical habitat.

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TIGER TRAIL

*I.S. Negi IFS (Rtd.)

"A Tiger is a large hearted gentleman with boundless courage and when he is exterminated-As exterminated he will be, unless public opinion rallies to his support-India will be the poorer by having lost the finest of her fauna"- Corbett.

James Edward (Jim) Corbett, the doyen of wildlife conservationists, had predicted in early thirties about the doom of tiger by the turn of this century. Had we heeded to his warning this magnificent cat would have been saved to a large extent. But that was not to be. At the beginning of this century there were more than 40,000 tigers in India and today there are less than 4,000. To be precise the tiger population in 1930 was estimated to 40,000 and in 1939 the figure came down to 30,000. In 1969 it crashed to a low level of 3,000. In 1972, the census result showed that only 1827 tigers remained in India. What at disaster!

As a natural corollary, tiger population should have grown as did the human and cattle populations over the years. But whereas human population has registered a three fold growth in the past 50 years tiger population has declined to one twentieth. We seem to have killed 760 tigers annually between 1930 and 1980. And if we take the annual reproductive growth into account, which should be quite substantial, this figure may well nigh go up to 1,000 tigers annually. What a shame!

THE GENESIS:

Tiger (*Panthera tigris tigris*) is believed to have oriented from islands around Caspian sea and travelled through Siberia, Manchuria, China, Thailand, Myanmar to India. In this marathon migration it inhabited many countries but nowhere did it settle and flourish so well as in India. It got acclimatized and adapted to varied geographical and climatic conditions of the sub-continent and made India its home. Except for the high Himalayas and desert region the Indian tiger, popularly known s the Royal Bengal Tiger, occupied whole of India, Nepal, Bhutan, Bangladesh and Myammar. The tiger extended throughout India including mangrove swamps of Sunderbans, evergreen and deciduous forests, and formidable heights of Himalayas tolerating an incredible variety of temperature and climate. It felt comfortable amid the mosquitoes, flies and fleas of Sunderbans swamps, endured the heat of central India and has as well been seen at 13,000 feet above sea level in the Himalayas.

NATURAL HABITAT:

Though the tiger is found throughout India, except the western states of Rajasthan, Punjab and Haryana, but Uttar Pradesh can boast of harboring maximum number of tigers. In the state of Uttar Pradesh the tiger is found in Shiwalik and Terai zone from river Yamuna in the west and Burhi Gandak in the east. The original and in some respect the most typical home of Indian tiger is the broken country of the Shiwaliks and the swampy Terai land fringing them to the south. The valleys between the Shiwaliks and the Himalayas are the ideal haunts for tiger. The tiger can be called a creature of sal which forms the gregarious stands interspersed with patches of grass resulting from

*Late Sh. I.S. Negi was Honorary Secretary of Wildlife Preservation Society of India who, wrote this article in Cheetal Volume-36, Nos.1-2, in 1997.

annual fires that sweep through the forest in dry season, bringing regeneration and a new flush of green grass for grazing by tiger's prey animals viz; samber (*Cervus unicolor*), spotted deer (*Axis axis*), swamp deer (*Cervus duvauceli*), Barking deer (*Muntiacus muntjak*), wild boar (*Sus scrofa*) etc. Broadleaved forests are the most suitable habitat of the tiger. The tiger requires three things in the vicinity where it stays. The presence of large number of prey animals, ample shade to sleep and enough water for drinking and bathing. Tiger loves swimming. In spite of their size and weight they can move through reed thickets with extraordinary skill in avoiding detection when stalking and are thus able to catch animals such as hog deer and wild boar which frequently shelter in them.

THE SYMBIOSIS:

The tiger lives on other animals, mainly deer and wild pigs which in turn live on food and water. Food is derived from trees, bushes and grasses. The herbivores do not plunder the forest resources but in return help them regenerate by seed dispersal. The tiger keeps the population of deer and other prey animals under check and thus protect the forest from over grazing and consequent degradation. This indeed is a delicate balance of nature maintained by wild animals. The tiger plays important role in restricting the population of deer and wild boar which otherwise would multiply to such an extent as to endanger the agriculture and forestry, as is evident in areas where tiger has been exterminated.

LOCAL MIGRATION:

During summer when drinking water becomes scarce in Terai and Bhabar and forest fires make the environment unbearably sultry, the enthusiasts and enterprising among the royal predator make regular summer migration upto the hills from the fly infested forests and marshes. From Shiwaliks and Terai the tiger ascends to the Himalayas upto altitudes between 6,000 to 10,000 feet and at times to alpine pastures. And it does not take them much time, perhaps not more than a couple of days, in reaching their summer resort. One of the habits of the tiger is that when it is on the move, it is on the move till it reaches the destination. But neither there was a fixed destination nor a chartered route and the tiger made its northward journey through numerous contiguous belts of forests, which not only provided it with much needed cover and security but also prey while in transit. Some times the journeys were straight, while at others dog legged. Whatever be the case but it was obligatory or traditional for the tiger to pass through certain points. Old people in Garhwal and Kumaon bear the testimony that they had seen tiger passing through certain saddle or saw it lurking near a temple site. Tales of tiger visiting temples are legion both in Kumaon and Garhwal. Local people narrated how tiger used to pay its annual homage to various temples including that of Kedarnath (12000 feet). Much of it may be exaggeration, mere gossip or even lies, but there is no gainsaying that tiger did visit the Himalayan forests regularly. This author saw a tiger shot by a District Education Officer in Baidni Bugial (altitude 12,000 feet) in Garhwal Himalayas in June 1951. the altitudinal limits to its range in the Himalayas was mainly dictated by the availability of prey animals and adequate cover. But it was all in the proverbial good old days, when the hills of Uttar Pradesh were more or less covered with forests. Though the forests were pepper potted by cultivation but there was fair amount of contiguity so as to permit up and down movements of tiger. In recent times lack of adequate cover and food at higher altitudes has confined the tiger to the Shiwaliks and bordering areas.

THE TRAIL:

Though tiger occupied almost the entire belt of Shiwalik and Terai of Uttar Pradesh there were some forest blocks where it abounded, obviously due to abundance of prey animals in those areas. For example, the forest belt form Hardwar to Kotdwar, area around Dhikala (which now comprises Corbett National Park), Sitabani, Kaladhungi and Pawalgarh near Ramnagar and Chorgalia between Haldwani and Tanakpur had maximum concentration of tigers. Though the tigier felt comfortable in these places all the year round, yet in summer when water became scarce and these places became unbearably hot due to forest fires, some of the tigers did move up to higher hills to beat the summer heat. They used to migrate to higher hills of Nainital (7,000-8,000 feet), Dudhatoli (6,000-9,000 feet) and to alpine pastures, past the dizzy heights of Mukteshwar, Gananath, Kausani and Gwaldam. The country lying in between Terai-Bhabar and the higher hills was covered with dense forest which provided safe passage for the tiger.

The tiger had good reason to migrate in summer months to higher hills. There was adequate cover, ample food and water in the hills. In cold climate the requirement of water was cut down to half, even less, but the appetite doubled. But there was no dearth of prey animals. In Nainital hills sambar, barking deer and seraw where in abundance and the tiger was happy, so much so that despite heavy snowfall some of the tigers preferred to stay there only. In Dudhatoli in addition to preponderance of sambar, barking deer, wild boar etc; there were thousands of domestic buffaloes brought by villagers for summer grazing and steadling. It was not uncommon to see a tiger lurking near a Khark (temporary steadling place) in Dudhatoli. Alpine pastures, as the name indicates, are excellent grazing grounds. They are famous for soft and succulent grass. In the past hill people of Garhwal took their sheep, goats, buffaloes and ponies to these alpine pastures for grazing in summer months. Tens of thousands of domestic animals grazed there day in and day out and it was but natural for the tiger to get lured and reach there, despite difficult terrain and inclement weather.

The tiger thus enjoyed the privilege of winter home and summer resort largely granted to it by nature. The forest belts served as corridors for the tiger linking its winter and summer habitat. Now the corridors have disappeared and with them disappeared the tiger trails and finally the tiger.

TURNING POINT:

Turn of first half of this century brought a spell of doom for the tiger. After forties there has been a steady decline in tiger population, when tiger suffered on two counts. One loss of habitat and the other indiscriminate killing.

A combination of factors have had an adverse effect on tiger population. They include habitat destruction, sport hunting and poaching initially for trophies but more recently for bones and other parts of animal, which fetch fabulous prices in international market. Middle men purchase tiger skin for Rs. 30,000 to 40,000 and sell abroad for Rs. 8 to 10 lakhs. China and Thailand are the main markets for tiger bones, blood and bile etc. Loss of habitat dealt a major blow to the existence of tiger. In Uttar Pradesh alone tens of thousands of hectares of forest land was deforested in Nainital Terai and alloted to freedom fighters and displaced persons for farming soon after Independence. Furthermore, thousands of hectares of sal forest was cleared for construction of Tumaria dam near Ramnagar, Nanaksagar dam near Khatima, Kalagarh dam right in the heart of

Corbett National Park and Sharda and Gandak irrigation channels in eastern Uttar Pradesh. All these mega projects ate into tiger territory. Out of them Tumaria and Nanak Sagar dams have completely dried up and the fate of kalagarh daml is also uncertain.

These schemes were ill conceived and met with the fate they deserved. But in this bizzare planning some of the finest stands of Sal (Shorea robusta) forest have been lost forever. These developmental schemes, colonization and human settlements in this area severed the contiguity of forest and led to its fragmentation disrupting migration of wild animals. The tiger which reigned supreme over the vast expanse of forest was denied both vertical and lateral migration and was left to the confines of a few small pockets.

The grassy chaurs and chanders within the Sal forests, which were either a missing link in the process of succession or formed as a result of retrogression, were essential part of eco-system. They provided favorite grazing ground for deer, especially cheetal. These places were known for favorite haunts of tiger too.

But after Independence these chaurs and chanders were planted with fast growing species such as Eucalyptus, Semal, teak, khair, shisham etc; These species, though of great commercial utility, do not make fodder for the wildlife. Forced by the circumstances the herbivores came out on the agricultural fields bordering forest and got killed. The loss ultimately was that of tiger. It was not only subjected to the pressure of reduction in size of its habitat but also to a decline in the number of those species on which it preyed. Driven to the brink of starvation due to paucity of prey animals, the tiger sometimes was compelled to resort to cattle lifting and man eating and was shot dead having been declared so.

TIGER VERSUS GUN:

Already feeling the pinch of shrinking habitat and battling for its survival the tiger had to face the battle of gun after the Independence. Though shooting tigers with permit was in vogue before the Independence also, but there was better observance of rules and regulations then. But after Independence it was free for all and a sort of competition among the shikaries. Some shot the tigers for sport and trophies while others tested their marksmanship. The novice among the shikaries killed one tiger and injured two, leaving them to die in shady nala. Considerable damage had already been done before shooting of tiger was banned in 1970. But worse than this, the tiger had to bear the onslaught of poaching for skin, bones and other parts even after the ban and tiger population crashed to all time low (1827 tigers in 1972). The velour, agility and fiery roaring or tiger could not match the fire power of gun. It seems there is no end to the miseries of the king of forest, the National Animal of India.

The Wildlife Protection Act (1972) proved to be no more than a public relation exercise. People who were caught poaching in Corbett National Park, Hastinapur Sanctuary and recently in Rajaji National Park were let scot free and on the contrary wildlife staff who tried to book the offenders were unceremoniously shunted off.

PROJECT TIGER:

Alarmed with the hopelessly reduced number of tigers, the government of India launched Project Tiger in 1973 in nine protected areas, Corbett National Park being the first. Today there are 23 tiger reserves with a total area of approximately 30000 sq.km. and harboring 1366 tigers. The

main object of launching Project Tiger was to ensure a viable population of tigers in India and development of tiger and its prey animals. Conservation of tiger cannot be seen in isolation. For the development of tiger habitat it is imperative to develop the food resource of the deer on whom the tiger subsists. Besides complete ban on tree felling and their removal from protected areas some sort of cultural operations and plantations of fodder species need to be done. If the forest is left to nature, in present day conditions, undesirable and unpalatable weeds like lantana, Congress grass etc, invade the area and make an impregnable mass of vegetation that benefits none.

For the success of Project Tiger it is necessary to also develop the socio-economic conditions of the people living on the fringes of protected areas. These people are inseparable part of forest eco-system. The villagers draw their sustenance from the protected areas and afford much needed protection to the wildlife. It is a stark reality that any forest oriented scheme launched without local people being taken into confidence is doomed to failure.

From the appraisal report prepared after the review of Project Tiger in 1993 it was revealed that tiger population in various tiger reserves was fluctuating and that the success the Project Tiger achieved in the initial years could not be maintained and even received a set back in some reserves. While poaching remains the major factor responsible for decline in tiger population, some other constraints also hamper to progress of Project Tiger. With the fragmentation of habitat the tiger has consequently been separated in small groups. No tiger population can survive and maintain itself indefinitely without gene diversity. For this it is necessary to have a contiguous population of at least 300 tigers besides a good habitat with adequate food, water and shelter. Tiger reserves are meant to meet these essential requirements. Research conducted at Sikhote-Alinisk Nature Reserve revealed that at least 50 tigers are needed to prevent in-breeding and 500 tigers needed to ensure its long term survival. This will have to be taken into account while developing tiger habitat.

Four sub-species of tiger Bali, Javan Chinese and Caspian are believed to have become extinct. Amur tiger also called Siberian tiger could be the next (250 to 500 remaining), given the low birth rate of Siberian tiger (2 to 3 cubs per year). A female Siberian tiger needs 80-160 sq. miles and male 230-300 sq. miles of land for free living. The Indian tiger requires five times more territory, although food is more plentiful in India then in Siberia. With fast depleting forest, where from will than so much land come, is a mute question. However, the conservationists world over optimistically feel that if any where the tiger can be saved from extinction, it is in India. Which is why the WWF-International is doling large amount of money for Project Tiger, whose success lies in the womb of future.

CAPTIVE BREEDING:

Breeding tiger in captivity is being considered in some quarters as the surest means of preserving its race. Sometimes back Chinese had suggested breeding tigers for slaughter. Every part of tiger's carcass is highly esteemed by the Chinese for its medicinal and aphrodisiac properties. There is a joke about Chinese that they will eat every thing four legged except table and chair. They are breeding 8 to 10 tigers per year for this purpose alone. Overcoming the initial hitch, some of the conservationist are not averse to Chinese suggestion. They argue that captive breeding for slaughter is definitely a lesser evil than losing tigers out of poaching. But this is altogether a different thinking to which not many people will subscribe. However, if the tigers are captive bred and trans located in the forest, it is not known whether they would be capable of hunting their own

prey, a process which in the wild requires two years by their mothers.

Remarkable, agility, powerful jaws, highly evolved brain and sensitive nose make the tiger super beast to reign the wild. These distinctive qualities and animal instinct cannot be acquired by captive bred tigers. Captive bred animals have a tendency to come near humans. These spoon-fed pets when released in the wild may not survive the ravages of poaching and other risk factors.

The Royal Bengal Tiger is sparkling king of jungle, a knight in shining coat. It is most a magnificent of nature's animals. By captive breeding it will be reduced to the status of Siberian tiger, which despite being biggest and heaviest of all tigers could be captured alive by a couple of lathi wielding masqueraders with the help of a pair of dogs. It will be unfair to down grade this brave and powerful feline and instead it should be allowed to flourish in its natural habitat. The money and resources that are being used in experimenting on the survival of tiger should be utilized in protecting, preserving and conserving the tiger in the forest.

WILDLIFE TOURISM:

India earns a whopping 30 million U.S. dollars annually in foreign exchange through wildlife related tourism. The foreign tourists come to India to see, along with other things, the tiger in jungle. "It is the wish of every visitor to see a wild tiger; even if he is moderately lucky and if he is not too pressed for time, there is every chance he will see one in a favored reserve like Corbett or Kanha. But one thing is certain; none who has once seen it in all its wild majesty in the pristine jungles of its habitat is ever likely to forget the sight", writes B. Seshadri in his book-India's wildlife and wildlife reserves.

Despite the awesome looks and fearful reputation, the tiger leave man alone if he leaves it alone. G.P. Sanderson wrote in his book; Thirteen years among the wild beasts of India (1972) "that ordinary tigers are extraordinarily inoffensive".

CONCLUSION:

India has the proud privilege of having 65% of the surviving tigers of the world. Our responsibility to preserve the vanishing tiger is, therefore, greater than any other nation. Government organizations as well as a host of N.G.Os. are seized with the problem of rehabilitating the tiger to its habitat. Instead of working separately and more often than not at cross purposes, let us put our heads and resources together and try to redeem the lost paradise.

"Of the worlds surface, only eight to ten percent is at present used for food productions, Pioneer agriculturists and scientists have demonstrated the feasibility of growing food-yielding trees in most unlikely locations-rocky mountain sides and deserts with an annual rainfall of only two to four inches. With the aid of trees, at least three quarters of the earth could supply human needs, not only of food but of clothing, fuel, shelter and other basic products. At the same time wildlife could be conserved, pollution decreased, and the beauty of many landscapes enhanced with consequent moral, spiritual and cultural benefits".

Dr. Richard St. Berbe Baker

MY EXPERIENCES WITH TIGERS OF CORBETT

*A.S. Negi, I.F.S.(Rtd.)

Corbett Tiger Reserve, the Country of roar, trumpet and song is one of the most exciting places one can think of. I was greatly fascinated by the beauty and wilderness of the place even when I was a School student. I got several opportunities to visit the beautiful and thrilling jungles of Corbett National Park right since 1963, since when my elder brother Mr. N.S. Negi, a popular and able Assistant Park Officer was posted there. His inning in the Park was one of the longest (more than 17 years). I had seen him stay inside the park at Dhikala during closed rainy season even in those days. He was the first official to volunteer to stay inside the park at Dhikala during rainy season when it was completely cut off from rest of the world and supply of ration and other subsistence material was only possible from Ramnagar, a place 50 km away, on elephant back, which took nearly two days. Even Dhikala becomes very inhospitable with tall grasses around living quarters and King Cobras, pythons and other poisonous snakes creeping everywhere. Malaria was a great menace and evacuation of sick to safer places was very difficult and time taking. Some Guards even committed suicide in such inhospitable conditions. Slowly some more staff volunteered to say with him and since then it became a practice for the park staff to say inside during rainy season for patrolling the interior areas.

I had read books of Jim Corbett and even as a boy I was very eager to see the tiger, one of the most beautiful animals of Indian jungles. Wildlife protection and conservation was not a catch phrase in those days like it it today and the hunting blocks around Corbett National Park (CNP) used to be very popular as the spillover population of tigers and other animals used to be a easy catch for the hunting permit holders. All the silvicultural operations (mostly tree feeling) were going on inside the Park and the only difference was presence of wildlife protection staff in addition to the regular territorial staff inside the park. Tourism at the time was a limited activity confined to Dhikala and few other Forest Rest houses. Greatest attraction was the Mahaseer fishing in Ramganga, which attracted large number of people from India and abroad. Only wildlife lovers and few elites were attracted by the Park. Tiger sighting used to be a fun as baiting was a regular practice. Even a token fee was realized from tourists after sighting of the tiger. Buffalo calf was used a bait which was tied at appropriate sites around Dhikala in the evening. There used to be one or more Machans (Watch towers) at each of these sites and tourists were taken to these machans on departmental elephants after the kill of the bait was confirmed by the patrolling staff in early hours of the morning. These very elephants were then used for 'Hanka' (driving away the tiger) in the tall grasses and visitors sitting on the machans could get a glimpse of the tiger while being driven away from the tall grasses. Sometimes two or more adult tigers or tigress with cubs would gather at the kill. In one such operation I had once seen 5 tigers from the machan one after another. This was my first experience of sighting of the tigers in Corbett or anywhere in the wild. Wild elephants in those days were seen very rarely around Dhikala

*300 Model Colony, Araghar, Dehradun E-mail- asnegi1943@gmail.com

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and I used to walk to the nearby towards in Dhikala Chaur (grassland) from the Dhikala complex and sit on them for every long hours watching herds of spotted deer, hog deer and wild boars. Tiger sighting from these Machanas was not easy in those days as great disturbance was caused by movement of timber trucks. My brother (Mr.N.S. Negi) was a keen angler and I also got interested in this activity. I used to scan Ramganga river (there was no reservoir at the time) for angling and it was normal to move in the thick islands of Ramganga even in late hours. These Islands locally known as *Majharas* are also very good habitat for Tiger but I never came across a tiger while walking along these majharas.

My visits to Corbett became less frequent after I joined service in Forest department. Many changes took place during this period. CNP became a Tiger Reserve in 1973. In fact the prestigious Tiger Project was launched in CNP itself. Ramganga dam had been built at Kakagarh submerging about 40 sq.km. area of prime grassland habitat of the park. The landscape of Ramganga river from kalagarh to Dhikala changed completely. All majharas in this stretch got submerged. Hog deer population decreased drastically. Migration routes of wild elephants were disturbed. Cheetal herds were fragmented. All logging operations in the park had been stopped. Park area had been increased by about 200 sq.km. to include some of the shooting blocks of surrounding areas. Shooting had been banned in the entire state of U.P. Corbett National Park was now being managed under Project Tiger and dual control had been withdrawn. Baiting of tigers had been discontinued and fishing in Ramganga had also been banned. Elephant population within park area during summer months had increased substantially. An area of about 300 sq.km. to the west of the Park had been declared as Sonanadi Sanctuary but its control was still with territorial Kalagarh Forest Division.

I took over as Field Director of Corbett Tiger Reserve in early November 1989. By then the general climate was in favour of tiger conservation at least in the Corbett Tiger Reserve (CTR). The count of tiger in CTR had increased from about 45 when project tiger was launched to about 90 when I took over (in about 15 years). During this period of 15 years two of the male tigers 'Dhitu' and 'Sheru' assumed international fame for their notoriety as man eaters. These excellent mighty males attacked and killed staff members and one ornithologist (Mr. David Hunt) and had to be captured and shifted to zoos. Another sick female tigress 'Lame-Dame' mauled two fodder cutter of the park and one female foreign tourist sleeping in a tent. The tigress had to be killed. Some of the tigers on the periphery of the park also turned man-eaters and had to be killed or captured. Jim Corbett, the famous hunter and conservationist who killed several man eating tigers and leopards in Kumaon and Garhwal had said that "a man eating tiger is a tiger that had been compelled through stress of circumstances beyond its control, to adopt a diet alien to it. The stress of circumstances is, in nine cases out of ten, wounds, and in tenth case old age." In case of 'Dhitu' and 'Sheru' the above was not true. They turned bold due to over exposure to human beings and lost fear of man which is otherwise inherent in them.

After taking over at Corbett, my dream of observing tigers in their natural habitat came true and whenever I found time I would go on elephant back or drive around Dhikala or sit on Machans (permanent or makeshift) for long hours to observe this great and magnificent cat of Indian Jungles. I also kept a log of tiger viewing and kept on recording my observations. Some of the interesting observations recorded by me are being given below:

The Tigers of Corbett - Aunique sight
Photo : Courtesy Corbett Tiger Reserve

11th December 1989

This was my first tiger sighting since I took over on 2nd November 1989. Heard tiger call at Lidkhalia the far end of 'Thandi Sadak' in Dhikala Chaur at 12.10 p.m. Switched off the vehicle and waited on road. The call was coming nearer. There was great excitement. The tigress emerged from tall grass but immediately retreated. Went back to car road and saw two figures at the end of the road towards lake. Viewing through binoculars, it became clear that it was mating pair approaching towards us. The tigress has found her mate. They walked together towards us till they were visible by naked eye but soon noticed our vehicle and disappeared in tall grass. During the short period I did not see them mating.

10th March 1990

While driving by Gypsy with Mr. G. Ganesh, Secretary, Forest Department, U.P. Govt. heard langoor calling near Ram Singh road at 7.30 a.m. Tiger was in the nala, a big male, probably, "Taimur". He immediately retreated to thick bushes between grass land and nala and was again sighted at the edge of grassland, staring at us from behind the tall grasses. Vanished in thick bushes immediately.

After we had returned to Khinanuali Forest Rest House some tourists informed that a tiger is lying on Sambar road. Without loosing time we turned our Gypsy towards Sambar road. While driving slowly near Anwla soti at about 8.30 a.m. a big male tiger leaped from left side of the road to the right. I halted the vehicle just at that spot to find that the tiger had turned back and was looking at us from a close range. Everybody on the Gypsy could see him in full view for nearly 2-3 minutes. We turned back and saw him again in the nala below while driving back to Khinanauli. Everyone was curious to see this beautiful big male again so we turned our vehicle and as we were going, the same tiger came on the road from the nala and was right in front. He turned towards us and sprayed on bushes on the up hill side, walked few yards along road and again jumped into the nala and vanished.

23rd March, 1990:

As soon as I arrived at Khinanauli FRH in the evening with Forest Minister of U.P. I was informed that a big stag was lying dead in Ramganga in midstream at Gathiarao. I immediately went to inspect. I was told that at 4.00 p.m. same day a tourist, while returning from Kanda road, saw a big sambar stag being followed by a small tigress from across the Ramganga towards Gathiarao wooden bridge. As the tourist stopped his vehicle to see this rare sight he saw the tigress overpowering and almost riding the stag near the bank of the river. The sambar was running for his life, the tigress reached the neck from above his back and by the time the stag lost his courage he was in the midstream of Ramganga. Tigress left him dead in deep boundary bed of Ramganga and vanished in the jungle on the hill slide. The tigress was fully aware of the presence of tourist vehicle as after killing the sambar she did not try to drag her prize and instead vanished in the nearby hillock to rest and watch her kill from there. The water was deep and stream was fast so we thought it might be difficult for the young tigress to retrieve the kill. So it was physically dragged out of water and kept at the bank on Khinanauli side. When we came next morning at 6.30 a.m. we found the tigress

lying in lantana bushes by the side of road. She had eaten her full diet in the night and was guarding the kill. The tigress was really very young and small sized. she managed to drag the kill to the bushes about 100 meters away from where we had left it and had eaten about 20 to 25 kg in one go. The kill had been carefully covered with grasses. The tigress immediately vanished into thick lantana buses and we did not disturb her further.

29th April 1990:

In the evening patrolling on elephant went to Fulai and the Mahawat Istiyaq tried to track the tiger in the 'Chaur' and in the streams but all other animals could be seen except the tiger. We went upto the far end of the chaur, that is Ringora. I told the Mahawat to return but he insisted to go upo the perennial nala near Ringora. As we were approaching the nala at 6.30 p.m. a tigress jumped out of the deep nala and went behind the ridge above. Immediately after came one grown-up cub and then another from the same spot and both went up on the top of a small covered hillock. The cubs were more than a year old, one male and one female. We took the elephant up on the hillock and found a Chital kill lying in bushes. The family after eating major portion was drinking in the nala. We went round the hillock when the male cub who was hiding in bushes growled and ran to the far away Jamun forest through open land in our full view. The tigress and female cub had eluded us and vanished in thick bushes on the higher hill.

10th June, 1990:

Had gone to the Park on routine round starting from Ramnagar by gypsy at 10.00 a.m. Took evening elephant ride from Dhikala and saw a male tiger at Ringora which immediately vanished in the bushes. While coming back to Dhikala by gypsy saw a glimpse of a tiger lying in water in nala below Sambar road at 7.00 a.m. The tiger had heard the sound of the vehicle and ran away in bushes soon after seeing the vehicle. While returning to Ramnagar saw a big male tiger in Dhangarhi nala about 3 km inside the main entrance gate. He stood on the other side of the nala in full view at close distance and remained there looking at us for nearly 3 minutes and then retreated to the steep hill above.

24th December, 1990:

Frequent tiger sighting was being reported in the grassland around Dhikala. A pair of mating tigers and one tigress with grown-up cub were being sighted by tourists on their early morning and evening elephant rides. I took 'Rambha' for evening patrolling with Mahawat Istiaq. Giving his account of tiger sightings of previous one week, he was taking the elephant to prospective places in the tall grasses when we heard a loud elephant trumpeting near Machan No.1. Istiyaq immediately turned his elephant and made him run in that direction. At 4.00 p.m. we were near the tigress who had been sighted by another tourist elephant. The tigress was furious, mock charging the approaching elephant. By then two more tourist elephants who had heard the roaring and trumpeting had also reached the spot and all the tourists on 4 elephants saw the tiger in full view and many photographed her. As more elephants had reached the spot, the tigress thinking that she had been surrounded, quickly withdrew in thick and tall grasses.

12th January 1991:

I was on a morning round on the elephant and after crossing the grassland we turned towards the water hole near Machan No. 3. We had hardly gone about 100 meters when we saw a large male tiger lying quietly at an open space between lantana bushes at 8.00 a.m. Our elephant stood at a distance of less than 15 meters but the tiger did not bother. I took photographs and moved the elephant a little ahead when the tiger got up and went towards 'Thandi Sadak'. We saw him crossing the road and disappearing in tail grasses.

13th February, 1991:

While I was on the morning round on the elephant with Dy. Director, Project Tiger, Govt. of India, we approached thick lantana bushes between machan No.1 & 3 tracking the pug marks of a tigress. Mahawat Istiaq pointed towards a lantana bush and whispered 'tiger'. Only trained eyes of an experienced Mahawat could have sported tiger in a thick lantana bush when only her ear with white spot was visible to us. The tigress slowly turned without moving a twig or branch and vanished in few seconds. The way she made use of her elastic body to turn around and move without moving the bushes was amazing.

13th March, 1991:

Mr. Geetha Krishnan, then Secretary, Expenditure, Govt. of India who is a keen wild lifter and good bird watcher was on a visit to Corbett Park. I accompanied him in the morning elephant ride from Khinanauli at 5.30 a.m. We crossed Ramganga near a temporary wooden bridge on Taulia road and as we had crossed the river we came across fresh pug marks of a male tiger. 'Hippy' the territorial male of the area had returned after his morning round of Khinanauli chaur where large number of chitals congregates at night near the FRH and elephant shed. We followed the pug marks upto Boxgaddi when we heard an alarm call of barking deer near Taulia Forest Guard Chowki. We followed the call but it was a false alarm call which is generally given by barking deer. We turned back and followed the pug marks on a small track along foot-hill towards Boxgaddi. We were about to reach the junction of Boxgaddi and Kishangaddi when we heard the alarm call of langur which is sure indication of tiger's presence. We had hardly gone few yards when we saw a large male tiger sitting under a tree looking at the nervous langur on a sissoo tree.The tiger sensing our presence immediately moved in the grasses on the left bank of Boxgaddi. When we approached him, he was lying in the grass and looking at us. We reached almost within 15 meters of the tiger. True to our guess, it was 'Hippi' the territorial male tiger of this area whom we had named so due to large tuft of hair on his cheeks. He felt disturbed by camera clicks and moved downwards quickly taking the beaten animal track along the foot-hills. We heard a chital call up in the nala and thought that there could be a female and followed the nala for sometime without seeing anything and turned back to follow the male. At a little distance we saw a small herd of chitals who were highly alarmed as their ears were turning round and they were looking in a particular direction. Surprisingly they did not call. Perhaps they had scented the tiger. We followed the direction in which the chitals were looking. Only after few minutes we spotted the tiger walking briskly in front of us. Within 5 minutes he was

seen lying under a lantana bush. With his head resting on his crossed forelegs and eyes being alternately closed and opened, we watched him from a respectable distance, photographed and left him lying there. It was a unique experience for Mr. Geetha Krishnan who said he had seen a tiger being tracked with the help of his pug marks successfully for the first time.

Same evening I took Mr. Geetha Krishnan to Paterpani side. While returning we heard chital alarm calls at the bifurcation of Gaujpani road at about 5.00 a.m. A group of Chitals was standing on a hill projection and continuously stamping their front foot and calling. They were all looking up in a particular direction. There was certainly a tiger sitting somewhere up under a tree which the chitals had seen but he did not move because he had seen our vehicle. We waited for 15 minutes but the tiger did not move out.

8th April 1991:

Resident males generally expertise in hunting certain species of prey animals in certain area during a particular season and same tiger can be seen again and again. This season 'Hippi' had expertise in hunting sambar in the area of Boxgaddi and Kishangaddi. I was informed about a sambar kill in that area by the patrolling staff. I set out on elephant Rambha with Istiaq Mahawat from Khinanauli and Roopkali of Nisar was also taken along as he had seen the kill on previous evening. As we approached the kill at 6.30 a.m. 'Hippi' mock charged Roopkali. He had over eaten from his prized kill, a over 100kg sambar stag and was feeling uneasy. We withdrew leaving him near the kill. I again went on the elephant to observe him in the evening and found him still at the kill. He immediately climbed up the hillside, and lay on higher ground behind trees, his tongue out and gasping loudly in the bright afternoon sun. After watching briefly and taking photographs we withdrew. As we were coming back and photographing a king vulture who was waiting on a tree branch for the tiger to leave the kill, we saw that the tiger went higher up on the hill and was making sure that we had really withdrawn. We also saw a king cobra swimming through a small pool of water.

30th April, 1991:

I was patrolling the Fulai area in the evening by elephant. I reached Ringora at 7.00 p.m. when I heard a sambar call on the hill. I asked the mahawat to hurriedly climb on the small hill as the tiger was expected to be on the other side in the nala. We saw four sambars standing at a close distance from us and looking down in the nala. Their tails were erect and they were stamping their front foot and giving loud alarm calls. As our elephant reached the saddle we found that a male tiger was drinking in the nala and sambars standing just 25 meters up were constantly looking at the tiger and giving alarm calls. They were perhaps waiting to judge the tiger's mood after he finished drinking water. As the sambars saw us they fled towards the hillside and tiger also withdrew slowly. We could see him looking at us and walking up on the grassy slope.

9th May 1991:

I decided to take an evening round of Dhikala chaur by gypsy to watch the elephant herd at the Lidkhalia end. I reached the 'Motasal' crossing on 'Thandi Sadak' when I saw a

young male tiger strolling on the grass at 6.00 p.m. hardly 50 meters from us. I observed an elephant herd grazing in the chaur with two or three tuskers trying to mix with females. The tiger first followed a hog deer unsuccessfully and then walked fearlessly towards the elephant herd. A tusker standing about 50 meters away from the main herd smelled the tiger and ran towards the main herd and joined it within minutes. The tiger disappeared in the tall grasses, with mother elephants warning their young ones through typical sound about the presence of tiger in the vicinity.

18th May 1991:

I was patrolling the area between Khinanauli chaur and Ramganga by elephant when at 7.30 a.m. I heard a shriek voice from a thick lantana bush on the Ramganga side of the 'Sher Batia'. This type of sound had neither been heard by me before nor by the mahawat who had been in the park for more than 25 years. It was a loud and repeated shrilling cry. On investigation of the bush, to our surprise we saw a tiger cub struggling in the bushes and trying to come out. Poor cub took the sound of the walking elephant for his approaching mother and started crying. We did not get down to examine the cub as there was danger of the tigress being in the vicinity. The cub continuously cried and tumbled on the undulating ground searching for his mother. I thought the tigress must have gone for a hunt and will return to the cub after sometime. I took my camera and sat on a nearby sisham tree from where the view of the cub was clear and I tried to completely camouflage myself on the shisham branches. For three hours I waited but the tigress did not turn up. After the elephant had gone the cry of the cub became feeble slowly and he lay down in the bushes. Whenever there was a slightest movement of the bushes by an approaching monitor lizard or even by the blowing wind it started crying again to give signal to her mother who never turned up. I withdrew to Khinanauli and consulted the experienced Mahawats and staff members as to why the mother had not turned up for such a long time. The cub looked very week. I went back to the spot on elephant at 6.00 p.m. to see whether the mother had taken the cub or fed him but the cub was lying there with very little strength left to cry loudly. It was now confirmed that it was a case of abandoned cub. We took all precautions and examined the cub closely. It was a female, very weak and just a skeleton. The size was that of a domestic cat and eyes were open. All this indicated that she was about 20 to 25 days old and had not been fed by her mother for the past more than 24 hours. We decided to bring her with us for a possible treatment. She was immediately named 'Khinni' having been found near Khinanauli. She had been without any liquid for all the 12 hot hours of May and must have been so since the previous night. We gave her boiled water with little milk to reduce the dehydration. She sucked the milk through a baby bottle which was available with one of the staff members. She was immediately brought to Ramnagar and given boiled water and little cow milk before being taken to an old and experienced veterinarian who had treated a tiger cub on a previous occasion. He started her treatment with life saving drugs and was hopeful of saving her. The veterinary doctor found the weight of the cub just 350 gms. and length 58 centimeters. Unfortunately the cub died at 1.15 a.m. on 20.5.92 despite the best efforts of Dr. Sarkar to save her. Everybody who had heard or seen her felt very bad about it. Dr. Sarkar suspected some intestinal disease which could be infectious and harmful to other cubs. The

tigress must have moved the healthy cubs to other location abandoning sick one. It looks cruel but these are the wild ways of nature.

24th and 25th May 1991

On information about a kill in Nibu Bojhi below Sambar road I set out on elephant to inspect it. It was a Chital kill made on previous day and had been finished except for the hind legs and few bones which were hidden in thick lantana bushes. I sat on a sisham tree with my camera for 4 hours from 9.30 a.m. to 1.30 p.m. but the tiger did not return to the kill. I withdrew and while going back to Dhikala I checked the water hole on Sambar road near Khinanaulti. I saw a tigress lying in the muddy water away from the main waterhole at 2.00 p.m. She immediately went into the bushes but I saw a grown-up cub running stealthily through the thick bushes. The tigress remained sitting in the bushes and I withdrew and came back to Dhikala. In the evening I again went to the water hole on elephant and found the tigress and two of her cubs one male and other female in the grasses. The cubs immediately vanished but the tigress mock charged and the elephant started trumpeting and raising his trunk. All three were seen running about in the grasses. I decided to sit on a Jamun tree near the water hole to see if they returned again and sent the elephants to Khinanauli with instructions to get back after an hour. Within 15 minutes the tigress came from above the road followed by one of her cubs probably male and went to the tall grasses. I heard bones cracking, a kill being devoured in the tall grasses. Second cub also joined from different direction. On return of the elephant I went to find all three eating a sambar kill. A half eaten wild boar was also lying nearby. Tigers generally become bold after sunset so they did not bother for our presence and we withdrew. Next morning I inspected the kills, which had almost been finished. I sat on the Jamun tree to observe the tigress with her cubs. I settled on the tree at 11.00 a.m. and at 12.45 p.m. the tigress approached from above the road and sat in the water whole but got immediately alarmed by the click of camera and suspecting something on the road she came down to the muddy spot where she was lying the previously day. This was visible from the tree I was sitting on. She calmly lay herself in the muddy pool watching the road. She did not suspect my presence as she was more careful about the road just above. She was facing me. At another click of the camera she looked up towards me from a distance of about 15 meters and could see my head projecting out in an effort to take a better pose of the 'lady' in water. She immediately changed her mood, growled at me and jumped in the opposite direction and was lost in thick bushes. She had perhaps commanded her cubs to stay back in the nearby jungle due to the disturbance experienced on the previous day. I could not photograph the cubs and mother together but I was more than satisfied to observe the sudden change in the mood of the tigress from a calm and peaceful face to a highly aggressive one. These wild creatures certainly don't like to be disturbed in their natural habitat.

27th November 1991:

One week capsule course in wildlife Management for All India Service officers was in progress at Dhikala. After the evening lectures some senior officers requested me to take them round the grassland for wildlife viewing. There was still light so I took three officers in

an open gypsy via Thandi Sadak. The gypsy was very slow. Around 5.45 p.m. when we were approaching the point from where a foot track goes to Machan No. 3 and were about 20 meters from there, a large tigress emerged from the bushes roaring and followed the gypsy for nearly 10 meters. Everybody got scared. Immediately after the tigress had retreated a tiger emerged from the bushes and roaring loudly mock charged the gypsy and almost reached at a touching distance and followed us for about 10 meters. That made the officers almost nervous specially a lady officer from Punjab. This was a mating pair being sighted in the area since last 2 weeks. It was for the first time that I saw tigers mock charging a vehicle. The reason was obvious, their courtship had been disturbed and the time was also slightly late when the tigers get unusually bold.

22nd January, 1992:

In the morning patrolling on elephant I came across pug marks of a male tiger below Sambar road on the bank of Ramganga which led us to thick and tall grasses. Tiger must have run away due to our presence in the area but we saw a fresh sambar kill half eaten lying in the grass. I decided to sit on a Shisham tree standing near the kill to watch the tiger. After being disturbed on the kill in the morning hours the tigers generally do not return to the kill till late afternoon but keep guarding their kill by their presence in the nearby area. I sat on the tree at 3.00 p.m. and covered myself well with twigs and branches. While I was patiently sitting I noticed a big male tiger approaching from northern side at 3.45 p.m. I held my breath so that the tiger did not suspect my presence on the tree. The tiger looked up on the tree and suspected human presence. He advanced slowly but continuously keeping his eyes fixed on the tree. I could see how cautiously tigers approach their kill. He came under the tree, looked up, growled and turned back and lay in the grasses facing me. He remained there for about 10 minutes and reluctantly retreated in the direction from where he had come. I remained on the tree with the hope that the tiger would return to the kill after sunset. My guess came true when at 5.30 p.m. I heard the growling of the tiger in the western corner. The tiger was approaching. He had taken a thickly covered route. He lay in the grass for some time and was perhaps waiting for the darkness to come but I climbed the tree to see where exactly the tiger was hiding. The tiger looked at the direction of the kill. When the tiger approached the kill he looked at me, growled loudly, picked up the kill and jumped in tall grasses with the half eaten sambar kill in his mouth. It was a great experience.

28th March, 1992:

During the visit to the park, of the Honorable President of India, Sri R. Venkataraman a sambar kill had been located by the field staff in the thick grasses between two streams of Ramganga near Gethia Rao. I took the Honorable President to the spot at 6.00 p.m. on elephant back. President's elephant was followed by 4 other elephants on which other staff of the VVIP entourage and trackers and guides of the Park were seated. We placed the President's elephant at a convenient position and asked other elephants to come from the opposite side so that the tiger could be sighted by the VVIP while crossing wide open space of dry stream. Unfortunately the tiger went in opposite direction which was indicated by a alarm call of a sambar and later by continues alarm calls of langurs. The tiger was seen by the

Park staff only.

Next morning it was drizzling and departure of VVIP from Khinanauli FRH was delayed. When the drizzling stopped at around 7.15 a.m. VVIP was taken to the same spot. The fresh pug marks had confirmed the presence of two tigers in the grasses. The performance of previous evening was repeated. Some members of VVIP party could see the tigers in the thick grasses but neither of the tigers would come out of the grasses and we had to move the President's elephant a little inside so that it was possible for him to see the tiger. A tiger came out from thick grasses and could be seen for a moment by all other members on the President's elephant except by the VVIP himself. The tiger disappeared in the thick grasses. Seeing a tiger is always a chance even if it is very near. The whole effort was to show to the Hon'ble President but alas, except him everybody on all elephants including other members of his party saw the tiger.

10th and 11th May 1992:

I had gone to the far end of Fulai chaur known as Ringora on the morning patrolling by elephant. While I was returning, a loud human voice was heard near Fulai watch tower. We rushed towards it and found another elephant with tourists standing at the edge of the jungle. The Mahawat of this elephant reported that a tiger had killed a chital doe in their presence a short while ago when he had made the noise to convey it to us. He pointed out towards a bush where the tiger was eating the kill. The tourists on his elephant looked excited and confirmed the killing in their presence. I could make out that the tiger was waiting in ambush for the Chital herd which retreats to the jungle after night long vigil on open grassland below. As the herd started climbing the slope the tiger successfully caught his prey and took it to a lantana bush nearby and started eating it while the tourist elephant was still there. Perhaps the tiger was too hungry. When we approached the bush the tiger walked away. It was a big male tiger who was being sighted quite frequently in Fulai area and had been recently named as 'Bholu' due to his innocent behavior. He had eaten only a small hind portion of the prey. The kill was clearly visible from a Jamun tree standing nearby, so I decided to sit on the Jamun tree to wait for the tiger to return. The elephant was sent back. I sat on the tree at 9.00 a.m. After waiting for long hours the tiger finally returned at 4.00 p.m. He came from behind the Jamun tree and as soon as he came under the tree, he suspected something on the tree and started looking up but could not see me due to good camouflaging. Had the tiger continued to advance towards the kill, his back would have been towards me and he would have not been able to keep an eye on the tree. I was astonished to note this intelligent behavior of the tiger. He slowly and carefully advanced towards the kill, all the time keeping his eyes fixed on the tree and swiftly lifted the kill and went in a thick lantana bush nearby. He could not push through the bush with the kill in his mouth so he left the kill at the edge of the bush, went round the bush to other side, entered the hollow of the bush and dragged the kill from there and started eating it. Due to thick bushes it was not possible to get good photographs but I was thrilled to study the behavior and was rewarded for long wait on the tree. It was also noted that tigers when disturbed on kills in the morning only return to it late in the afternoon however hungry they night be.

Next morning I wanted to check whether the entire kill had been consumed and

whether the tiger was still around. I set out from Dhikala by elephant early in the morning and reached near Fulai watch tower at about 7.00 a.m. As our elephant was negotiating the escarpment between the low grassland which remains submerged in lake water during rainy season and the jamun forest above it, I saw a tiger lying at the edge of the escarpment and looking with an angry face in the nala below, which was not visible to us. As our elephant went a few steps up, the tiger got up and quietly walked in the jungle. Now the nala where the tiger was looking was visible. We were surprised to see a big tusker standing there and tossing his head in anger and looking up in the direction of the tiger. The steep ground separating the tusker and the tiger was hardly 10 meter high. Strangely the tusker did not give any alarm call to the herd of elephants which was in the area, though not very near. Presumably the tusker saw the tiger all of a sudden when he was coming towards him and did not retreat as the tiger was on higher ground and very near. Our presence disturbed their natural interaction and they went their respective ways. Such interaction in the wild is only a rare sight. We went in the direction of the kill and sighted the tiger again walking on the road in front for nearly 20 yards when he suddenly disappeared in thick bushes.

Photos by : Rishad Naoroji

Mountain Hawk-Eagle (Spizaetus nipalensis _adult)

Crested serpent-eagle (Spilornis cheela_Adult)

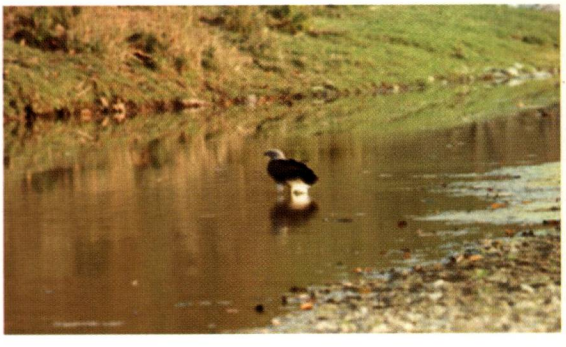
Lesser fish-eagle (Ichthyophage humilis_Adult)

Changeable Hawk-Eagle (Spizaetus cirrhatus limnaeetus_Juv)

Photos by : Rishad Naoroji

Mountain Hawk-Eagle (Spizaetus nipalensis _adult)

Crested serpent-eagle (Spilornis cheela_Adult)



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Mountain Hawk-Eagle (Spizaetus nipalensis _adult)

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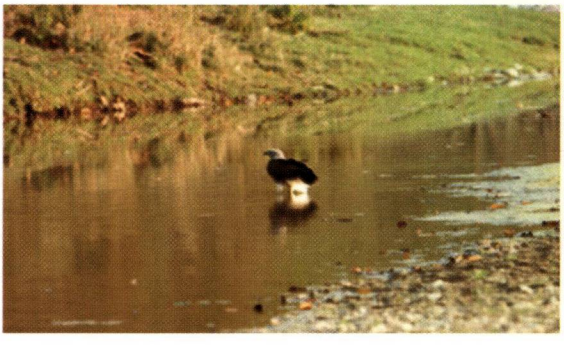

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REMINISCENCES AND ADVENTURES WHILE STUDYING RAPTORS IN CORBETT NATIONAL PARK

*RISHAD NAOROJI

One had always heard of Corbett National Park and the famous man-eating tigers of Kumaon through Jim Corbett's books, all of which I had avidly read by the time I entered my teens. Corbett National Park had also gained eminence by being the first protected area in the country and the spring board for Project Tiger. It was in fact the tiger that initially fired my enthusiasm for wildlife and conservation. In 1964 when I was 13 years old I visited Corbett and Kumaon for the first time with my parents. It was to be a visit that subconsciously determined the focus of my life many years later. Though disappointingly no tiger was seen on this short trip, the grand setting and vistas of the park especially along the blue-green Ramganga river with reflecting white-washed boulder strewn banks, the extensive chaurs (the river wasn't dammed then) and a back-drop of the Himalayan foothills were not easily forgotten. I particularly remember trekking with an armed guard (which was then allowed), being shown my first tiger pug marks, and observing a herd of elephants crossing the Ramganga; a young calf's repeated attempts to climb up the steep, slushy bank and eventually being pushed up by its mother. We then proceeded to Ranikhet where I was shown a Bonelli's Eagle at its nest on a cliff ledge (overlooking Philkholi village) and instantly mesmerized by the pair's beauty, power and regal bearing. One plunge directly from the nest-ledge into the forest below, the attack directed at a covey of Black Partridge particularly left an indelible impression on my mind. Many years later, when the opportunity to study birds of prey arose, I took up the challenge. Alas, the stands of Deodar and Oak below the cliffs which then supported a good prey population of Kaleej, Chukor and Black Partridge have long since vanished; and replaced by Chir plantations. The eagles do not breed there anymore, and the species is not easily seen in Ranikhet except a vagrant.

March 1990

Since that impressionable trip I studied raptors in many parts of the country. As research associate in a BNHS raptor project, I was part of a three man team surveying protected areas throughout the country for suitable raptor study sites. Corbett was the last park to be surveyed. The number and variety of raptors was so great that it took us (with frequent stops) well over three hours to reach Dhikala, a drive which usually takes about an hour. As we drove into the chaur we had close-up views of a Short-toed Snake-Eagle rising from the ground with the tail-end of an almost fully swallowed snake protruding from its bill. Among the many species of migratory and resident raptors, we saw some of the target species singled out for study such as the Lesser Fish-Eagle, Mountain Hawk-Eagle, Rufous-bellied Eagle and the Collared Falconet, which were well represented in the park. My main objectives within the project were to study the breeding biology of raptors, and Corbett was chosen as the study area for investigating the breeding of some of the little known species. We settled into the park on

*Godrej Bhawan, 4th floor , 4A Home street, Fort, Mumbai – 4 00001

25/5/90 and were temporarily given accommodation at Gairal, until suitable accommodation became available outside the park for the duration of the monsoon. Lulls during the tedious chore of looking for accommodation (there being nothing really suitable outside the park) were utilized for surveying the park and adjoining forest. Likely areas for future nest searches were also noted during this acclimatising period when we realized that the highest diversity and concentration of raptors were to be found along the Ramganga river, adjacent chaurs and forest. It was at Gairal that I experienced the first of many close encounters with elephants. At 2 am I was awakened from a fitful sleep by my apprehensive colleague Dr Vibhu Prakash as an elephant was grazing a few feet away from the rest house. It was the ill-tempered, wide-ranging Makhana, who, the forest staff had warned us was in the vicinity of Gairal. He started butting our jeep and pushed it sideways right into the verandah damaging the top and rear body. We shouted to deter him but he moved unhurriedly towards the kitchen door (undoubtedly attracted by enticing odours) which he broke down. Not able to enter through the narrow space, he wrenched off the wire mesh netting of the kitchen window, and siphoned off all edibles like fruit, vegetables and flour with his trunk, to the accompaniment of the din of plates and utensils being broken. He left only when all eatables (one week's stock of food) was eaten, leaving us a devastated kitchen to clean up. In August at the height of the monsoon we confronted the same Makhana face to face when rounding a curve at 9 p.m. approaching Mohan village. He charged without a moment's hesitation and gained ground faster than we could reverse. Just when we had geared ourselves to ditching the jeep, jumping out and fleeing (each man to himself), the forest guard accompanying us regained his presence of mind and fired a blank into the air and the Makhana veered off the road and melted into the darkness.

On 7th of June a nest of the Lesser Fish-Eagle was located outside the park at Garjia on the east bank of the Kosi river. Observations commenced immediately, the nest clearly visible through a telescope positioned off the main Ramnagar Dhangarhi road overlooking the river. A few days later the nest was deserted by the pair and when inspected empty. Eagles frequently lose eggs to predators, inclement weather, in this case perhaps human disturbance (as it was breeding in a populated area), or as sometimes happens the eggs could be addled, and the adults incubate much longer than the normal period before giving up. Not much thought was given to the cause of this loss and passed off as a natural phenomena, though I was disappointed as I dearly wanted to study its breeding behaviour. Little did I then realize that this event was the forerunner of a series of similar mishaps, and that the focus would shift to environmental problems affecting this specie's breeding success.

Often raptors are located where they are not at all expected. On 14th June 1990 I remember observing an adult Eurasian Hobby *Falco subbuteo* hawking insects and grassland birds such as larks, pipits and bush chats in Dhikala chaur, after each sortie returning to its look-out perch, a boulder in the grassland. The species is a breeder in the Himalayas and also a migrant. This individual should either have been breeding in the Himalayas or long left for extralimital breeding grounds. But the most exciting sighting the coming winter was an Eastern Marsh Harrier, a juvenile way beyond its range; a new bird for Corbett Tiger Reserve and a range extension.

One memorable experience within the first two months at Corbett was a savage encounter with

the Rock Honey Bee. Through early June there appeared an influx of bees in the park. We were still moving around the park due to delayed rains. On 21st June driving through the chaur near Sher Bhoji, accompanied by two forest department veterans, Harak Singh and Kesar Singh, we were suddenly attacked by an angry swarm of Rock Honey Bees, probably because we had intruded their flight path. Within seconds I was completely engulfed by the seething mass and stung painfully on the wrist. Luckily that morning I was well clad in a thick shirt, long pants and canvas hat which undoubtedly shielded my head and face. Having no prior experience with bees, I did not realize the full extent of our predicament. Seeing me thus put the fear of the devil into the two men (which at the time I thought unfounded), and they jumped out of the moving jeep and started running towards Dhikala; their only concern being to keep as large a distance as possible between our jeep and themselves. The bees took instant reprisal for this understandable desertion. They lifted off me like hot steam and viciously attacked the two men. A serious mishap was averted when Kesar Singh almost blinded in the process of protecting his face and eyes stumbled right in front of the moving jeep as we approached to rescue him, while Harak Singh took off his clothes and set them on fire, flaying his arms wildly, the smoke ineffective against this relentless attack. We eventually got him into the jeep, but he was severely bitten on the face and head, the ears bleeding and appeared like red pin-cushions embedded with scores of stings. As Kesar Singh aptly summed it up later, "a thunder shower of bees rained upon us". Needless to say my respect for the Rock Honey Bee increased tenfold from that day onwards.

From June to September during the monsoon we were based at Dhangarhi. I explored and surveyed areas for raptors outside the Park. There are some excellent habitats for wildlife (though not as diverse as within the Park) which provide a necessary and vital buffer to the Park against encroachment from the north, east and west. One of my favourite survey transect was the drive from Dhangarhi up to Bhounkhal at 1300 m via Chimtakhal through excellent forest (which forms the northern buffer) on the southern slopes. I would recommend this route to any birder. From the topmost ridge facing north stretch the foothills upto the visible snow peaks 180 km away. Southwards the forest slopes right down to the park. To the right (east) the river Kosi and to the left (west) the Ramganga, and the plains beyond to the south. Here can be seen a diverse mix of hill and forest birds; among the raptors in winter the Black Eagle, Besra, Shikra, Kestrel, Rufous-bellied Eagle (soaring above the southern slopes), Bonelli's Eagle, all eight species of vultures (including the spectacular Bearded Vulture), Lesser Fish-Eagle, Pallas's Fish-Eagle, Serpent Eagle, Hen Harrier, Mountain Hawk-Eagle, Kites, Buzzards, and the Shaheen Falcon. Another good bird-watching location, especially for forest raptors is Kumeria, at the base of the eastern forested slopes below Bhounkhal, on the Mohan/Ranikhet road. By mid September early arrivals such as Pallas's Fish-Eagle, Osprey, Aquila species and altitudinal migrants from the higher foothills begin to be sighted. Collared Falconets appear often in pairs (I would like to know from where) and are frequently sighted till February. On 21/9/90 I saw my first Brown Dipper along the Kosi River. It was fascinating watching its most unusual method of foraging — walking submerged along the river-bed, occasionally flicking over small stones for macro-invertebrates such as larvae of different fly species and other insects.

In early October a most memorable trek was undertaken from Dhangarhi to Sultan

watch tower and back; a total of 24 km. At the outset we were regaled with a close-up view of two Mountain Hawk-Eagles; among my favourite raptors. As we approached the watch tower (the highest point in the Park) an Osprey glided past. The canopy of some of the upper ridges is a mixture of Sal and some Chir Pine. The view is breathtakingly spectacular, perhaps even better than from Kanda. It was interesting to notice how perspectives change from a height, and distances compressed. To the north the view extended upto the Manila ridge, and in the foreground, the Kartkinow and Bhounkhal massif dominated just a few kilometres away. Mohan was almost at our feet with the Kosi flowing immediately to the east. The high summit ridge above Bhalon village (in vicinity of Kunj Kharak – accessible from Nainital and Kaladunghi) was clearly visible immediately beyond the Kosi. To the south behind us Ramnagar, and further south the plains. Suddenly a pair of Rufous-bellied Eagles (a species for whose nest I have long searched in vain) hove into view according us a close and uninterrupted sighting. Circling above was a Shaheen Falcon, repeatedly stooping at the pair. One of the eagles performed a tremendous stoop through the forest canopy into the valley below, perhaps after prey — or was it displaying? The Shaheen was also observed at close quarters exhibiting its mastery of flight as only a Peregrine can. We witnessed a swift, masterfully executed controlled dive through the upper canopy barely 10 m below us.

By February, I had moved permanently to Dhikala and had familiarised myself with the area within and outside the Park. The main task now lay ahead: to locate nests for studying the lesser known target species which would soon commence breeding — an exciting prospect. I decided to concentrate on the Lesser Fish-Eagle and the Mountain Hawk-Eagle the first season. The obvious place to start was Gethia Rao, where two pairs were usually always seen. Till end March the pairs were under my constant surveillance, and hitherto unknown behaviour such as their different hunting techniques (the species feeds solely on fish), unique courtship displays, the wide range and connotation of their unusual vocalisation, copulation, interaction with different pairs and other species, territorial requirements, etc. was gradually recorded. During this period, a pair of Serpent Eagles which eventually bred near Gethia Rao regaled me with courtship behavior never recorded before, which shows that even common species are full of surprises. The pair were circling with wings held in a sharp 'V', the courtship flight punctuated by the 'wing-shivering' display, performed by a single bird or the pair together. It involved a slow downward glide with wings drooping below the body and wing-tips curved downwards, interspersed with frequent 'vibrations' of wings every few seconds. Many uncommon migrants were observed during this period eg. Cinereous Vulture, White-tailed Eagle, and Peregrine Falcon among others. Also during winter large numbers of Himalayan Griffon can be seen in the park. End February I located a Bonelli's nest where the pair were incubating. Occupied thus with observations and dawn to dusk nest-watches, the little spare time available was utilized atop the Dhikala watch tower, with a magnificent birds-eye view of the Ramganga and bordering chaur. An ideal location for watching birds, during winter the Collared Falconet and soaring raptors; with a fair chance of observing the resident tiger of the area coming down to the river to drink and cool off during the hot hours. I have observed unusual interaction among raptors, and obtained candid views of tiger with a telescope which can never be had from the back of an elephant.

On 3rd March 1991 I located the first of many nests of the Lesser Fish-Eagle on Sambar

road. The pair were incubating, the female for longer periods (than the male) and at night. Subsequently another nest was found on Sambar road and one at High Bank. Undoubtedly a pair were breeding at Gethia Rao, but logistic difficulties made it difficult to monitor.

As studies on the Lesser Fish-Eagle continued, the raptor checklist was steadily increasing to an impressive variety of species. By mid-March a nest of the Mountain Hawk-Eagle was located. A fearless and pugnacious species, which unhesitatingly attacks intruders near the nest, even humans, and my assistant Suresh once suffered a gashed scalp. Thereafter it didn't take much persuasion for him to wear a protective helmet and jacket on future nest-inspection climbs. Mr. A. S. Negi, former Field Director arranged the loan of material for building the machan some 20 m from the nest and sat in the hide for a whole day observing the goings-on at the nest.

Due to degradation outside the Park, Mountain Hawk-Eagles feed mainly on forest passerines e.g. Mynas, tree pie, parakeet, etc., while those in the Park supplement passerine species with a fair amount of larger prey e.g. Kaleej, Red Jungle-fowl, etc. Two unusual interactions stand vividly out. We were approaching a nest (containing a downy chick) for observations when a Yellow-throated Marten was sighted climbing up the nest-tree. Aware of its predatory activities on nests of the Lesser Fish-Eagle, we watched with bated breath as it climbed into the nest. Unlike the shy and inoffensive Lesser Fish-Eagle which deserts the nest at the approach of this predator, the brooding Mountain Hawk-Eagle female took offensive action, driving home her talons thrice (with corresponding shrieks from the Marten) as it raced down the tree-trunk. She returned to the nest only after ensuring the Marten had left the vicinity. Langurs, well known predators of eggs of the Lesser Fish-Eagle and Serpent Eagles were determinedly attacked if they ventured too close to the nest. On one occasion, a pair of Spotted-winged Stares made frequent forays to the nest, to collect the down that the nestlings had shed, belly feathers of adult, and other soft material to line their own nest.

The other interesting incident occurred towards the end of May when the Mountain Hawk-Eagle fledgling was nest-independent. The female was by then accustomed to our presence and perched nearby. As Ali Hussain my assistant and I walked past the nest-tree, we flushed a Jungle Night Jar. As it flew literally from our feet the female pursued, closing in on it through the foliage with feet stretched forward and toes open for grasping, but missed it by a hair's breadth when her wing smacked into a branch. Incidentally the habit this species has of nesting close to villages (outside the park) and its belligerence towards people who venture close to the nest makes it difficult to protect nests from vandalism. I had to place a 24 hour guard for nest protection.

The next year 16th April 1993 precisely, courtship and copulation of the Collared Falconet was observed near Dhikala. This was a particularly important find as the breeding of the species had not been recorded in the subcontinent. A local cot or "Khatia" was strung between two trees out of reach of elephants (or so we thought) for observations about 25 m from the nest. Data recording on hitherto unknown behaviour commenced almost immediately, and information on courtship, prey and incubation was recorded. Unfortunately incubation was unsuccessful and the pair suddenly disappeared from the area.

The 1994 season involved some additional breeding studies, but not of any rare significant species. I had earlier touched upon the complete lack of breeding success in the

Lesser Fish-Eagle. Since 1990, I had been monitoring nests of this species for breeding success. The egg shells collected from a nest in 1991 on analysis contained significant amounts of chemical contamination mainly DDT and Dieldrin. In 1995 a concerted effort was made to conclusively determine the extent of chemical contamination through the prey base, and what effect it might have on breeding success, aside from predation. Samples of egg shell, dead nestlings, fish and water are currently being analysed. If results turn out positive, further investigation will be necessary and management techniques and policies will have to be implemented for the conservation of the species and the riverine system as a whole.

All adventures and wonderful experiences over a six year period cannot be recounted within the confines of an article. The natural beauty of the Park, its great importance as a protected area harbouring a vast array of birdlife (including some globally threatened species) probably unrivalled in the subcontinent (including 49 species of diurnal birds of prey alone; about 70% of the total raptor species found in the country), impressive numbers of mammals (including good populations of key species eg. tiger and elephant), its riverine system with good numbers of both garial and mugger, a large variety of fish-eating birds and mammals, and good numbers of the now threatened Mahseer should in my opinion make the park a worthy candidate as a world heritage site.

Conclusion

The sheer beauty and magnetism of the reserve will, I'm sure, continue to lure me and other naturalists and visitors alike to it repeatedly; not discounting the fact that I hope to unravel the secret lives of some of the rarer, forest dependent raptor species. There is a need to continue studies specifically on the Lesser Fish-eagle. I still survey the park annually and have not yet observed a single juvenile. This indicates that the rivers flowing into the park are still contaminated causing unsuccessful breeding. The rivers Sonanadi, Palain, Ramganga and Kosi all originate in the foothills. The upper reaches of these rivers north of the park have a dense human population and the slopes are intensively step-cultivated. The chemicals and pesticides used to control agricultural pests run off into the river systems during the monsoon. Furthermore, pesticides are used to poison fish and dynamiting upstream of the park's northern border also have detrimental effects on the Lesser Fish-eagle population. Oregano chlorine pesticides and polychlorinated biphenyl's (PCBs) detected in eggshells result in thinning of eggshells, and when the adult Lesser Fish-eagles incubate, the shells crack causing breeding failure. Unless a solution to the use of pesticides upstream is found, the Lesser Fish-eagle may disappear from Corbett in the years to come. This would be disastrous as the Corbett area is the stronghold of the species in India. Furthermore, as the species breeds in close proximity to rivers in adjoining forest, deforestation along streams and rivers limits the choice of suitable nest-sites.

I wish the Park, with many firsts to its credit, the very best for the future in this Platinum Jubilee year. I hope the authorities will strive for a protected forest corridor between Chilla (Rajaji National Park) and Corbett. I also hope that Sonanadi Sanctuary and Sitabani Reserved Forest block will at some future time be included within Corbett Tiger Reserve. May it prosper and continue to be among the prime custodians of the country's irreplaceable natural heritage.

Distribution pattern and relative abundance of smooth-coated otter *Lutrogale perspicillata* and crocodilians in the aquatic ecosystems of Corbett Tiger Reserve, India

[1]Asghar Nawab and [2]Syed Ainul Hussain

ABSTRACT

The status of smooth-coated otters and crocodilians (mugger *Crocodylus palustris* and gharial (*Gavialis gangeticus*) in Corbett Tiger Reserve was examined during 2001-04. The study revealed that the occurrence of otters was restricted only to three rivers that were relatively undisturbed and supported potential microhabitats. The relative abundance of otters was 0.35 km^{-1} for Ramganga River, 0.34 km^{-1} for Mandal River and 0.26 km^{-1} for Palain Rivers while the abundance of crocodilians varied from 9.92 km^{1} ± 2.75 for mugger and 5.25 km^{-1} ±1.67 for gharial. In the rivers where otter presence was observed destructive fishing followed by removal of sand and boulder and bank side vegetation as well as occasional poaching was observed which may affect otter population negatively.

Keywords: Smooth-coated otter, Corbett Tiger Reserve, distribution pattern, status, crocodiles, gharial, disturbance

1. Introduction

In landscapes where natural habitats have been severely fragmented by human induced factors, conservation of biological diversity is a growing issue. In human dominated landscapes or otherwise the establishment of Protected Areas (PAs) forms the corner stone of the strategy for biodiversity conservation. These PAs are now offering opportunity to examine the natural pattern of the distribution of species of conservation significance and their resources use in case an effective restoration measure is to be planned. We examined the factors associated with occurrence of the smooth-coated otters (*Lutrogael perspicillata*) and other large vertebrates such as crocodile *viz.* Indian mugger crocodile (*Crocodylus palustris*) and gharial (*Gavialis gangeticus*) in the Corbett Tiger Reserve comprising of Corbett National Park, Sonanadi Wildlife Sanctuary and surrounding Reserved Forests.

The smooth-coated otter is distributed throughout south Asia and Southeast Asia (Pocock, 1941; Hussain, 1993; Hussain and Choudhury 1997). It is a semi-aquatic social carnivore found in large groups where the basic family group consists of adult female and her offspring, father and older siblings often join the group ((Foster-Turly, 1992; Hussain 1996). Though in much of its range it occurs sympatrically with Indian mugger crocodile and gharial there is paucity of information on factors affecting their occurrence. The smooth-coated otter is listed as "Vulnerable" in the IUCN Red List (Hussain *et al.*, 2008) and Appendix II CITES indicating its conservation dependence. Once common in the wetlands and low lying areas of South Asia it is now restricted to a few PAs and needs

Dr. Syed Ainul Hussain Wildlife Institute of India, Post Box # 18, Chandrabani Dehra Dun - 248001, Uttarakhand, India **Email:** hussain@wii.gov.in

restoration measures. The gharial is distributed in the northern rivers of the Indian subcontinent and it is "Critically endangered" (Choudhury *et al.*, 2007) needing immediate conservation measures where as the mugger is "Vulnerable" (CSG, 1996). In this paper we present the status of smooth-coated otter and crocodilians in the aquatic ecosystems of Corbett Tiger Reserve, India, elucidate the threats to their sustained reproduction.

2. Study area

This study was conducted in and around the Corbett Tiger Reserve (CTR) situated in the foothills of the Himalayas extending into the Upper Gangetic Plains southward in the civil districts of Nainital and Pauri Garhwal in Uttarakhand State. The area lies between Latitudes 29°25'N to 29°48'N and Longitude 78°05'E to 79°08'E. The Reserve encompasses a total of 1288.32 km^2; this is represented by 520.82 km^2 of National Park, 301.18 km^2 of Sonanadi Wildlife Sanctuary and the remaining 466.32 km^2 as buffer areas. The CTR experiences a tropical climate with three distinct seasons - winter from November to February, summer from March to June and monsoon from mid June to October. Vegetation of the Reserve consists of mixed deciduous tropical and sub-tropical forests, with *Shorea robusta* being the dominant species (Pant, 1986). The flat grassy plains sometimes quite extensive occupy a special and significant ecological status in the Reserve. The CTR forms an important repository of the natural heritage of India and is one of the best protected areas of the lower Himalayas and the last refuge of a number of endemic, depleted and threatened species in the lower Himalayas (Lamba, 1980). Mammalian fauna of the Reserve is represented by 50 species belonging to 9 orders.. The CTR holds the second largest population of the Tiger (*Panthera tigris*) in the world and the region is one of the last remaining strongholds of a potentially viable population (Jhala *et al.*, 2008). The Reserve forms a crucial part of the habitat of the North-Western population of Asian elephant (*Elephas maximus*) (Johnsingh and Negi, 2003). Out of the approximate 1300 species of birds found in the Indian subcontinent, more than 40% have been recorded in CTR. 549 species of birds (both resident and migrant) have been reported by Sharma *et al.* (2003). Herpetofauna are represented by 23 species of reptiles while surveys conducted have indicated high species richness and abundance of lower invertebrates (Lamba, 1987). The gharial (*Gavialis gangeticus*) is the subject of a re-introduction programme and in January 1987, 27 young gharials had been released in the Park (Derek, 1989). The other prominent species of aquatic ecosystem are the mugger crocodile (*Crocodylus palustris*) and freshwater turtles. Hussain (1995) has reported 29 species of fish from the waterways of the Reserve.

The drainage system comprises of Ramganga, Sonanadi, Mandal, Palain and Kosi Rivers; with many small tributaries of their own. These rivers are biologically productive due to moderate temperature, low current velocity and preponderance of large deep pools (Joshi, 1994). A dam constructed in 1962 on the Ramganga River at its confluence with Sonanadi River created a vast reservoir spreading over an area of about 80 km^2 of which 42 km^2 falls within the CTR. Kosi River flowing along the eastern boundary of the reserve, is another important perennial source of water (Bhartari, 1999). The drainage system has greater conservation implication since distribution and abundance of several wildlife species are

known to revolve around these water sources.

3. Materials and methods

The methodology to survey otters followed Hussain (2003), Hussain and Choudhury (1997); Anoop and Hussain (2004). Major waterways of the CTR were categorized based on their types (perennial/seasonal) and presence of disturbance factors (disturbed/undisturbed). These waterways were divided into 5 km segments. Information about habitat, marking places, and otter signs was recorded for each 500 m section in different seasons. Searches covered a 100 m x 15 m strip along the river edge. A team of four trained surveyors conducted the surveys by walking along both the river banks and searching for the otter signs. Along the reservoir, some part was walked or surveyed by boat, whichever was convenient. In each study section, a positive site was defined as a 'used site' where spraint, footprints and holts and other signs of otter presence were found.

Only spraints separated by more than 5 m were considered as different sites (Melquist and Hornocker, 1983; Newman and Griffin, 1994; Medina, 1996). Otter holts in the area were also mapped. Holts are occupied dens with fresh spraints deposited close to the entrance over several days. Active scent marks were recognized by a strong odour. Any observations (*ad libitum*) on otters during the course of the study were recorded, while special efforts to see otters were made by positioning on vantage points within viewing distance (ca. 30-50 m) at the opening of holts at sunrise and sunset. All coordinates of locations were recorded using a global positioning system unit (Magellan Trail Master hand held GPS unit). The variables measured were:

1. River characteristics
(i) Width (cm) - distance between the banks.
(ii) Average depth (cm) - depth at four points from the shore till the middle point.
(iii) Water current (slow=1/fast=0).
2. Shoreline characteristics
(i) Approximate percentage of total area (100 m x 15 m) of the plot occupied by Rock and boulders, Sand, Mud, Clay and Alluvial deposits.
(ii) Gentle or steep bank slope (degrees)
(iii) Number of dead logs - used as basking sites.
(iv) Number of streams joining the main course of river.
(v) Shoreline vegetation - (presence=1/absence=0).
(vi) Escape distance (cm) - Nearest distance from shore to tall and dense vegetation (grasses and shrubs).
(vii) Escape cover - percentage grass and shrub cover available.
(viii) Average grass height (cm).
3. Prey availability - (presence=1/absence=0).
4. Associated fauna (mugger and gharial) - (presence=1/absence=0).
5. Disturbance (presence=1/absence=0).

The disturbance data were collected on six variables perceived as threats to otters in the study area. They were evidence of poaching of otters, destructive fishing practices using dynamite or poison, removal of sand and boulder, extraction of bank side vegetation,

extensive domestic use of water and visible pollution, and livestock grazing. Based on the extent of severity these variables were ranked from 1-6 and recorded as presence/absence in respective plots. For analysis a qualitative score index for disturbance variables was developed. The index is expressed as percentage of disturbance intensity and is calculated as,

$$DI = \frac{{}^{j}\sum d_j \times 100}{{}^{i}\sum d_i}$$

where i = score given to i^{th} disturbance (ranging from 1-6).

J = observed disturbance in one plot.

DI = disturbance index (ranges from 0 to 100 per cent).

4. Results

Distribution pattern and relative abundance of otter

In the CTR the presence of otters were recorded from the three river systems *viz,* Ramganga, Mandal and Palain Rivers. Of the total 380 plots sampled 15.5% (n = 31) proved positive, with maximum being recorded from Ramganga (17.5%, n = 14) followed by Mandal (15%, n = 6) and Palain (13.75%, n = 11). Although intensive search were made (n = 180), no sign of otter activity was recorded from Sonanadi, Kosi rivers and the area surrounding the reservoir (Table 1). A total of 838 signs were recorded over the study period, the most common being spraints, followed by tracks and grooming sites. A total of eight den sites were recorded of which six were from Ramganga and one each in Palain and Mandal Rivers which remained active throughout the course of the study. The occurrence of otter signs did not vary between the study years (spraints: t =0.894, $P>0.05$), (tracks: t = 0.818, $p>0.05$), (grooming sites: t = -0.707, $p>0.05$) and (den sites: t =0.158, $p>0.05$) (Table 3). Signs were also compared seasonally and only mean density of spraints were found to be significantly different (t = 3.23, $p<0.05$) while those of tracks (t =0.818, $p>0.05$), grooming sites (t = -0.707, $p>0.05$) and den sites (t = 0.158, $p>0.05$) were not significant (Table 2).

Four different otter groups ranging from 4 to 16 individuals were recorded and the basic group structure consisted of the resident adult male with female and her offsprings. During winter 2003-04, two otter groups recorded from river Ramganga River showed increase in group size with the addition of 1 and 4 juveniles respectively. The relative abundance of otters was estimated as 0.35 km^{-1} for Ramganga River, 0.34 km^{-1} for Mandal and 0.26 km^{-1} for Palain Rivers. The surveys led to a detection of four otter groups in the study area with an estimate of 41 individuals (35 adults and 6 juveniles) with a mean of 5.1 ±1.55 individuals (Table 3).

Abundance of crocodilians

The records maintained in this study are based on direct sightings of gharials and mugger, their sizes ranging from >2m to >4m. During the study period 129 (9.92 ± 2.75) mugger and 42 (5.25 ± 1.67) gharial were recorded. Table 4 provides the abundance estimates of crocodilians in the CTR.

Intensity of disturbance and otter occurrence

Among the sites used by otters Mandal River recorded a maximum of 0.06 (60%) disturbance index, followed by Palain River 0.02 (20%) and 0.01 (10%) for Ramganga

River. Among the unused sites Kosi River recorded the maximum of 0.09 (90%) disturbance index. No single disturbance factor can predict the absence of otters from a particular site. However, if the cumulative effect is considered then disturbances do occurs in otter presence sites as well but these disturbances were recorded in the buffer areas. Within the used sites i.e. Ramganga, Mandal and Palain rivers various forms of fishing activities were a major form of disturbance (Mandal 6.5%, Ramganga 1.6% and Palain 1.1%) followed by livestock grazing (Palain 32.7%, and Mandal 21.7%), removal of sand and boulder (Mandal 10.3% and Palain 0.3%) and there were instances of poaching also recorded from river Ramganga. At the sites where otter presence was not recorded, livestock grazing (Sonanadi 75%, Kosi 46.3% and Reservoir 11.9%) and extraction of bankside vegetation (Kosi 25.6%) were noted as major disturbance which affects their occurrence (Fig. 1).

5. Discussion

Historically, Pocock (1939) had reported the probable occurrence of all three species of otter viz. Eurasian, smooth-coated and Asian small clawed otters in freshwater systems along the Himalayan Terai. Bhargava and Prasad (1975) reported occurrence of *L. perspicillata* while Lamba (1980) and Hussain (1998) had reported occurrence of *Lutra lutra* in small groups along Ramganga River within the core zone of CTR. This study revealed that in the low lying areas such as the Ramganga, Mandal and Palain rivers, smooth-coated otter occurs. This was confirmed by the measurements of the footprints (n = 56, median length = 8.57 ± .006 and breadth = 6.37 ± .006) (Kruuk *et al.,* 1993) and this was further confirmed by the shape of the rhinarium (Foster-Turley, 1990) and flat underside of the tail (Pocock, 1941) when a pair of poached otters were retrieved from the Ramganga River and examined.

To ensure the successful management and conservation of otters, determining their distribution and abundance is an essential first step in this process. Otters are secretive, often nocturnal or crepuscular and live in low densities thus they are difficult to study (Robitaille and Laurence, 2002). Therefore making direct estimates of population size and structure is often not feasible, hence the number of sprainting sites and the number of spraints (signs) has been considered as an index of otter activity. If spraints are present, this means that otters are there, but if absent, this does not necessarily imply that there are no otters, nor is a stretch of river with many spraints likely to be used by otters more than another with fewer spraints (Kruuk et al., 1986). Also, the level of marking by individuals may be influenced by age, sex, social position and seasonality, among other factors, while populations at very low densities may mark their ranges very little (Kruuk, 1995).

In most of their distribution range in India, otters are known to occur along with several aquatic species such as gharial, Indian marsh crocodile, saltwater crocodile (*Crocdylus prorosus*), Ganges river dolphin (*Platanista gangetica*) and several species of turtles (Testudines). This study in CTR reveals that otters along with the associated fauna i.e mugger, gharial and several species of turtles tend to share similar habitats. They seem to maintain mutually agreeable strategy to avoid conflicts in sharing resources for foraging, grooming and basking. Hussain (1993) observed that the smooth-coated otters generally avoided sites that were used by mugger for basking and defecation, and often confronted

gharial in the National Chambal Sanctuary, India. Studies on the dietary habits of mugger in Andhra Pradesh have revealed the presence of otter furs in the scats of Indian marsh crocodile (Kumar *et. al.,* 1995) and alternately the hatchlings of crocodiles can also be potential prey for otters (Kumar, 1993).

Presence of anthropogenic disturbance is known to negatively affect otters and scent-marking behavior of mustelids (Newman and Griffin, 1994; Perrin and Carugati, 2000). *Lutra perspicillata* is rather more tolerant to human presence than the other two species (Shariff, 1984; Foster-Turley, 1992; Anoop and Hussain, 2004). In the present study, the effect of human activity varied between different sampling sites. Anthropogenic disturbances on otter population and its habitats were recorded from areas that lay close to the vicinity of the reserve boundary. Poaching is major threat to otters in the region. As many as five otters were poached from along the Ramganga River during the study period.

Destructive fishing practices appeared to be the major form of disturbance and locals usually practice destructive methods such as, dynamiting or hammering and use Ichthyotoxic plants to poison fish. This leads to indiscriminate killing of large number of fish (juvenile as well as brood fish) that adversely affects the population of fish and as well as water quality of the rivers. Therefore, it is imperative to regulate fishing practices in the Rivers. Sand and boulder extraction were the major commercial activities associated with Kosi River, however within the reserve area sand and boulder extraction were recorded along Mandal River though they were for domestic use. The depletion of sand from banks reduces the sites potential for grooming and resting (Kruuk and Balharry, 1990; Anoop and Hussain, 2004). There is heavy browsing and grazing by domestic livestock along the banks and their mere presence dissuades otters from landing (Shenoy *et al.,* 2006). The local people also resort to burning of undergrowth in order to enhance the growth of fresh crops of fodder resulting in denuded river banks. As evident from the study, otters tend to tolerate human disturbance and can use river stretches which provide prey and good escape cover, however, absence of anthropogenic pressure appeared to be important for denning sites, as all otter holts were found in secluded areas, far from human presence.

Conservation implications

The comparison of historical information with present study suggests fluctuation in otter population over time. This could be because of intrinsic factors in the population or due to anthropogenic pressures such as poaching or due to intra-specific competition from reintroduced gharial and mugger. This necessitates development and implementation of long term monitoring programmes for otters and associated aquatic fauna in the Reserve. As the presence of shoreline vegetation is a prerequisite for otter habitat, this should be maintained or wherever necessary restored. Hence, it is recommended that a buffer of about 25 m of riparian vegetation should be left unburnt while carrying out routine practices such as control burning. River stretches which provide ideal habitat conditions and are more frequently used by otters need special attention in terms of management and protection, also patrolling should be extended to buffer areas especially during monsoon when otters are expected to move long distances chasing their prey i.e. fish which travels upwards for spawning. This may include searches for habituated and non-habituated (deserted) den sites, presence of

otter signs per km stretch and recording of presence of sufficient riparian cover. Otter sighting *logbooks* can be maintained at respective rest houses and visitors should be encouraged to record their sightings as; date, place and numbers seen. Since locals living in the periphery of the protected area have civil rights to extract forest resources, participatory programmes can be initiated to create awareness among them about the ecological importance of otters in the surrounding water bodies.

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Table 1. Observation of otter evidences in different survey sites in Corbett Tiger Reserve, India. ud = undisturbed habitat, d = disturbed habitat

Survey site	Sampling intensity	Otter evidence
Ramganga (ud)	40 km (n = 80)	17.5% (n =14)
Mandal (ud)	20 km (n = 40)	15% (n = 6)
Palain (ud)	40 km (n = 80)	13.75% (n = 11)
Sonanadi (d)	10 km (n = 20)	0
Reservoir (d)	40 km (n = 80)	0
Kosi (d)	40 km (n = 80)	0
Total	190 km (n = 380)	15.5% (n = 31)

Table 2. Mean density ± SE of otter signs between years in Corbett Tiger Reserve, India. Significance level = $p<0.05$

Variable	2002-2003	2003-2004	t-value
Spraints	6.04 ± 0.22	6.33 ± 0.25	0.894 (P =0 .372)
Tracks	2.2 ± 0.19	1.97 ± 0.21	0.818 (P = 0.415)
Grooming sites	1.49 ± 0.17	1.52 ± 0.19	-0.707 (P = 0.945)
Den sites	0.94 ± 0.14	0.91 ± 0.15	0.158 (P =0 .875)

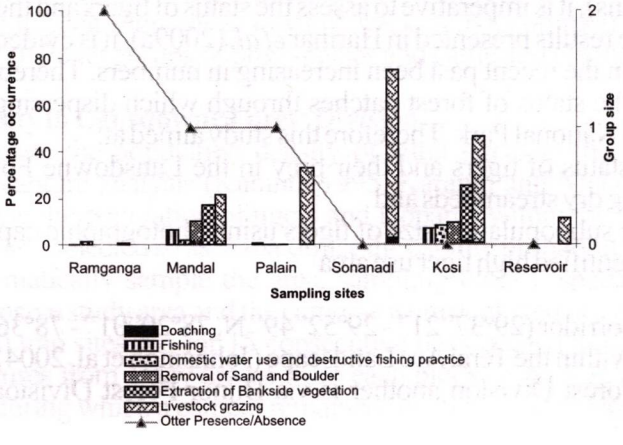
Table 3. Group size of otters as recorded from Corbett Tiger Reserve, India during 2002-4

Site	Seasons					
	Winter			Summer		
	Adult	Juvenile	Total	Adult	Juvenile	Total
2002-2003						
Ramganga (Group A)	4	0	4	0	0	0
Ramganga (Group B)	10	0	10	0	0	0
Mandal	6	0	6	6	0	6
Palain	15	1	16	0	0	0
2003-2004						
Ramganga (Group A)	4	1	5	5	0	5
Ramganga (Group B)	10	4	14	14	0	14
Mandal	6	0	6	0	0	0
Palain	16	0	16	0	0	0

Table 4. Abundance of crocodilians in Corbett Tiger Reserve, India

's	Distance covered (km)	Individuals recorded / (Encounter rate)[a]							
		Summer		Winter		Summer		Winter	
		Mugger	Gharial	Mugger	Gharial	Mugger	Gharial	Mugger	Gharial
ganga	40	13 (0.33)	9 (0.23)	9 (0.23)	5 (0.13)	11 (0.28)	14 (0.35)	8 (0.2)	8 (0.2)
ı	40	1 (0.03)	0	1 (0.03)	0	1 (0.03)	0	1 (0.03)	0
voir	40	31 (0.85)	2 (0.05)	10 (0.25)	2 (0.05)	28 (0.7)	1 (0.03)	13 (0.33)	1 (0.03)
ıadi	5	0	0	0	0	2 (0.05)	0	0	0

[a] Encounter rate = Individuals recorded / Distance covered



Assessing the tiger population in the Rajaji-Corbett corridor (Lansdowne Forest Division), Uttarakhand, India

Abishek Harihar, Suniti Bhushan Datta

Introduction

The Terai-Arc Landscape, encompassing the Shivalik hills and the Terai flood plains, is one of the five landscapes identified for tiger conservation in India (Jhala *et al.* 2008). With a human population density of >500 people km^{-2} (the national average is 300 people km^{-2}); Johnsingh et al. (2004), populations of tigers occur in forest patches comprising a matrix of protected areas, multiple use forests (Forest Divisions), agricultural land and human habitation. The north-western portion of this landscape spans from the Sharda River in the east to the Yamuna River in the west, forming the distributional limit of tigers in the Indian subcontinent. Encompassing the protected areas of Corbett Tiger Reserve and Rajaji National Park which cover only c. 30% of the area, it is fragmented into three disjunct units identified as Tiger Habitat Blocks, with poor or no connectivity because of anthropogenic disturbances (Johnsingh *et al.*, 2004). Covering nearly 6,600 km^2, this hilly (bhabar) tract could potentially support a minimum of 150 adult tigers if corridors were established and adequate protection provided (Johnsingh, 2006).

Earlier studies (Johnsingh *et al.* 2004) documented a high tiger use within Corbett Tiger Reserve (c. 41%) and adjoining forest divisions (Ramnagar Forest Division; c. 20.7%) based on frequency of indirect tiger signs recorded from 82 km of sign survey. In addition, Contractor (2007) estimated a high density of >16 tigers per 100 km^2 in Corbett National Park (c. 520 km^2; part of Corbett Tiger Reserve). This highlights the role of this Reserve as a critical source population. Conversely, Johnsingh *et al.* (2004) documented a relatively lower tiger use within Rajaji National Park (c. 12.9%), most of which was attributed to signs recorded in Dholkhand in the western sector and the eastern sector. However, following the minimization of anthropogenic pressures from within the Chilla Range of east Rajaji National Park in 2004, Harihar *et al.* (2009a) documented evidence of breeding tigers, suggesting the potential of the east sector as a source population. Yet sign encounter rates of tigers between the western and eastern sectors of Rajaji National Park differed significantly indicating that the status of tigers in the western sector was precarious even though most forest ranges have been free of Gujjar settlements since 2005 (Harihar et al. 2009b). As the eastern sector is contiguous with Corbett Tiger Reserve, the documented recovery in Chilla range (Harihar *et al.*, 2009a) could be attributed to the colonization by dispersing individuals from Corbett Tiger Reserve facilitated by the Rajaji-Corbett corridor (Lansdowne Forest Division). However, given that the Lansdowne Forest Division supports very less wild prey densities (personal observations), it is imperative to assess the status of tigers and their prey.

Based on the results presented in Harihar *et al.* (2009a), it is evident that tigers in east Rajaji National Park have in the recent past been increasing in numbers. Thereby making it important to identify and assess the status of forest patches through which dispersing individuals could have colonised east Rajaji National Park. Therefore this study aimed at:

1. Assess the status of tigers and their prey in the Lansdowne Forest Division using sign surveys along dry streambeds and
2. Estimate the subpopulation size of tigers using photographic capture-recapture sampling within the identified high tiger use area

Study Area

The Rajaji-Corbett corridor (29°37"21" - 29°52"49" N, 78°20"01" - 78°36"18" E) is one of the key corridors identified within the Terai Arc Landscape (Johnsingh et al. 2004). It has two passages one is via Lansdowne Forest Division another is via Bijnor Forest Division (Figure 1). This study

focuses on the Rawasan – Sonanadi Corridor (via Lansdowne Forest Division) (Singh *et al.*, 2005). The corridor is situated in the foothills of the Himalayas in the lower Siwaliks and falls under Haridwar and Pauri Garhwal districts in Uttarakhand (Dhaundiyal, 1997). The present study is focused on two ranges of the corridor Laldhang (17,112 ha.) and Kotdwar (11,276 ha.) (Johnsingh *et al.*, 2005). The corridor is approximately 10 km long and 4-5 km wide (Singh et al., 2005). The altitude varies from 150m towards the southern boundary to 1,150m above sea level along the northern boundary (Johnsingh et al., 2004). The corridor extends from Rawasan River in the west to North Kothri in east. In the north of the corridor are a number of villages on hills and the terrain slopes towards south to the bhabar tract which is densely populated (Dhaundiyal, 1997). The northern villages are at an average elevation of 1,200m a.s.l and those situated in the southern belt have an average elevation of 400m a.s.l.

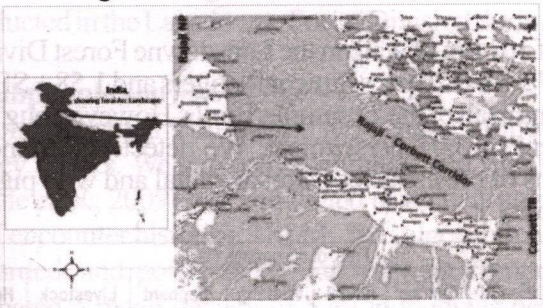


Figure 1. Rajaji-Corbett corridor

Methods

Assessment of the occurrence patterns of tigers in Lansdowne Forest Division

Streambeds or raus were chosen as the line of walk for tiger sign surveys. Indirect evidences in the form of pugmark, scats and scrapes etc give a good indication of the relative use by tiger of the study area. Since the parameter of interest is of animal occurrence, all signs (tracks and pellets) were recorded. The beginning and end points of the raus were marked using a GPS for future monitoring. For the analysis, transect 'segments' comprised the basic sampling unit. Each segment was of 250m in length. Pugmark encounter rate was measured as the total number of pugmark encounters upon the total number of segments. The exercise was carried out with a team of 2-4 persons and on an average, took 3-4 hours per transect (1.25-1.5 km/hr). Since the parameter of interest was the relative occurrence in the area, and not abundance, pugmarks of tigers and leopards, whenever seen were identified and the continuity of the pugmark trails was used to identify them as separate encounters. Care was taken to avoid double counts of trails. Tracks of ungulates were recorded in each segment as low (<5 track trails), common (>5 track trails) and abundant (>10 track trails). Pellet groups of prey species and cattle and elephant dung depositions were also recorded.

Estimation of tiger density in Lansdowne Forest Division

In order to estimate the population density of adult tigers in the study area we used photographic capture-recapture analysis (Karanth 1995, Karanth and Nichols 1998). Trap sites were identified to estimate the population of tigers and leopards within the intensive study area. These trapping stations were selected so as to maximise the capture probabilities of tigers (Karanth 1995). In order to systematically sample the area, sampling blocks (spatially separated) were identified within the intensive study area and the cameras were deployed in a phased manner. Each block consisted of 15-20 trap sites run for 15 consecutive days/occasions. Thus, each sampling occasion combined captures from 1 day drawn from each block. One trap-night was a 14-hour period (1700-0700 hrs) during which a camera remained functional. As the study site falls outside

of a protected area, all the trapping sites in a block were checked on a daily basis and the cameras were not deployed during the daytime. Every tiger captured was given a unique identification number after examining the stripe pattern on the flanks, limbs and forequarters.

Following the identification of tigers, capture histories (X matrix) was developed and analysed using program CAPTURE™ (Rexstad and Burnham 1991). The density (D) of tigers in the study area was estimated as the population size (N) divided by the effective sampled area(A(W)) where A (W) was estimated by creating a polygon over the trapping stations (A) and a buffer width (W)) estimated as half the mean maximum distance moved(½ MMDM) by recaptured tigers added to the camera trap polygon(A)

RESULTS & DISCUSSION

1. Status of tigers and their prey

The 21 streambed transects totalling to effort of 101 km of walk in the Lansdowne Forest Division, yielded a mean pug mark encounter rate of 0.77 ± SE 0.20 per segment for tigers and 1.58 ± SE 0.11 per segment for leopards. We detected tiger signs in all of the 21 sampled trails. However, pug mark encounter rates varied from 0.15 per segment to 3.07 persegment. We detected evidence of livestock and people in all sampled trails. Signs of prey species (sambar, chital and wild pig) and elephants were found across the landscape (Table 1.).

		Pugmark ER (No. per segment)		Freq. of occurrence (%)							
Trail ID	Effort (km)	Tiger	Leopard	Tiger	Leopard	Sambar	Chital	Wild Pig	Elephant	Livestock	Human
Trail 1	2.5	0.2	0.8	20	50	50	40	80	50	100	100
Trail 2	9	0.19	0.64	16.67	47.22	44.44	41.67	72.22	19.44	100	100
Trail 3	6	0.38	2	37.5	100	62.5	66.67	83.33	79.17	100	100
Trail 4	2.5	0.4	1.9	40	100	70	70	90	70	100	100
Trail 5	4	0.19	2.06	18.75	100	68.75	68.75	81.25	56.25	100	100
Trail 6	4	0.19	1.69	18.75	100	68.75	56.25	81.25	81.25	100	100
Trail 7	6	0.71	1.92	50	100	75	41.67	79.17	58.33	100	100
Trail 8	2.5	0.5	2	50	100	70	60	80	40	100	100
Trail 9	5	0.35	1.1	35	80	65	35	65	30	100	100
Trail 10	6	0.5	1.13	50	70.83	62.5	33.33	66.67	29.17	100	100
Trail 11	4	0.31	1.75	31.25	93.75	56.25	31.25	62.5	25	100	100
Trail 12	5	0.15	1.85	15	100	50	25	80	0	100	100
Trail 13	6	0.21	1.5	20.83	75	58.33	29.17	66.67	37.5	100	100
Trail 14	2	0.38	1.88	37.5	100	62.5	37.5	62.5	12.5	100	100
Trail 15	5	0.15	1.75	15	90	60	30	60	20	100	100
Trail 16	17	3.07	0.97	88.24	58.82	94.12	67.65	72.06	0	86.76	86.76
Trail 17	4	2.94	1.5	100	81.25	100	100	68.75	0	56.25	87.5
Trail 18	6	2.25	1.25	100	70.83	100	100	66.67	0	100	100
Trail 19	1.5	1.17	2.67	66.67	100	66.67	66.67	83.33	0	100	100
Trail 20	1.5	0.67	1.67	50	100	66.67	66.67	66.67	0	100	100
Trail 21	1.5	1.38	1.25	75	75	75	75	75	0	100	87.5

Table 1. The 21 trails surveyed (a total effort of 101km) (Figure 2) between December 2009 and March 2010 in the Rajaji-Corbett Corridor (Lansdowne Forest Division) (Figure 1), with survey effort, encounter rates of tiger and leopard pugmarks per 250m segment, and frequency of occurrence (no. of 250m segments with signs/total no. of segments surveyed, as a percentage) of signs of tigers and leopards, of the main prey species (sambar, chital and wild pig), elephants, livestock and human activity.

Figure 2. Signs of tigers (marked in yellow dots) recorded and sign-surveys (marked in red) conducted in the Lansdowne Forest Division during December 2009-January 2010.

2. Subpopulation size of tigers

We photographed 9 different tigers 19 times following an effort of 1,800 trap nights across three survey blocks. We captured five males and four females. The Bernoulli model for unknown *N* (Royle *et al.*, 2009) was conducted using data augmentation, augmenting the data set with 50 'all zero' encounter histories. The MCMC algorithm was run for 10,000 iterations, the first 2000 were discarded, and posterior summaries were computed from the remaining 8,000 iterations. We estimated a mean density of 5.49 individuals per 100 km^2. Estimates of density and posterior summaries of model parameters are presented in Table 2.

Parameter	Mean	SD	2.50%	Median	97.50%
-	0.15	0.233	4.366	0.15	0.069
P	0.15	0.028	0.116	0.15	0.229
Density	5.49	0.035	2.49	5.47	8.43

Table 2. Posterior summaries for the camera trapping carried out in the Kothri and Nauri Forest Ranges of the Lansdowne Forest Division from February to March 2010.

Summary

Intensity of tiger use in the Lansdowne Forest Division has increased substantially since the previous assessment carried out by Johnsingh *et al.* (2004) and overall frequency of use of the area by tigers was ~44.5%. This demonstrates conclusively the critical role played by this corridor in facilitating tiger movement between Rajaji National Park and Corbett Tiger Reserve.

The estimated density of tigers in the Kotri and Naudi range of Lansdowne FD is 5.49 ±0.035, which is comparable to the estimated density of tigers within Rajaji National Park (Harihar, A., *unpublished data*).

If protection measures in this region are strengthened, this region will continue to be of conservation value to the Corbett-Rajaji Landscape.

Chowkham female

Dimki female

Nimbu Sot female

Nauri female

Chowkham male

Laldarwaza male

Dimki male

Nauri male

Seeyathapli male

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Gharial Estimation and Habitat Assessment Survey 2008, Corbett Tiger Reserve, Uttarakhand, India: Field Survey Report

Subir Mario Chowfin

Abstract

The gharial, *Gavialis gangeticus*, is a charismatic, endemic crocodilian of the North Indian Subcontinent. Amongst the rarest members of its order, the species was recently upgraded from "Endangered" to "Critically Endangered", (IUCN 2007) and the strength of wild breeding population has been recently estimated as not exceeding 200 individuals. (Whitaker and Members of GMTF, 2007).

A study was undertaken to assess the gharial, *Gavialis gangeticus* population and its reproductive status in the Corbett Tiger Reserve (CTR) in 2008 in association with the Uttarakhand Forest Department.

Within CTR, a total of 101 individuals were observed during 2008 with a size class distribution of 10 adult males, 32 adults, 10 juveniles and 2 yearlings. Mugger crocodiles and freshwater turtles were also observed during the course of the survey co-occurring in many areas with gharial.

Evidence of recent successful reproduction is indicated by the presence of young individuals and / or recent nesting with direct confirmation of reproductive activity in 2008 evidenced by observations of recent nesting activity, nests, and /or predated nests.

In CTR, nesting success appears to be adversely affected by water level fluctuations in the reservoir, limiting available nesting sites and producing horizontal and / or vertical separation of the nests from the proximity of the water due to receding water levels within the main reservoir. In addition, cattle disturbance and or nest predation may further limit nest success.

Introduction

Formerly, gharial habitats in CTR stretched from Boksar to the Kalagarh gorge of the River Ramganga, an area now submerged by the storage reservoir of the hydro-electric dam at Kalagarh established in 1974. A preliminary survey just prior to dam closure in 1974 sighted just 5 gharial and questioned whether the gharial population at CTR would survive in the newly established reservoir setting there, based on low population numbers, no evidence of successful breeding, and possible competition with mugger crocodiles. In the present study, it was documented that the gharial population at CTR consists of more than 100 individuals of representative age/size classes. At CTR, gharial survive and reproduce in the man-made reservoir habitat and have apparently adapted to the lake –like environment and of the Reservoir and water fluctuations associated with hydro-electric dam operations.

Methodology

The study in CTR was conducted in three phases: **1) Phase I: Population Assessment Survey -** The Winter Daytime Maximum Count was used for population assessment and

C/o The Gadoli and Manda Khal Wildlife Conservation Trust, PO Box. 27, Pauri, District Pauri Garhwal, Uttarakhand. 246001. Email: schowfin@yahoo.com

estimation. Binoculars (8x) were used to spot and count basking gharial during foot or motor boat transects, made ideally under conditions of low ambient temperatures, clear skies with strong solar radiation and absence of breeze/wind. Population estimation additionally included counts made from stationary vantage points. Counts were repeated to estimate variance at select sites by running multiple transects. Gharial counted were entered by the below described size class intervals into field data sheets (Table No. 1); borderline individuals were assigned either the smaller or the larger size classes, on the spot, to avoid ambiguity resulting from deferment.

Table No. 1: Gharial Size Classes used for Enumeration

S.No.	Category	Size Class (Ft.)	Size Class (cm.)
1	Adult Male (with Ghara)	> 12	> 360
2	Adults*	. . .	270 – 360
3	Sub-Adults	5 – 9	150 – 270
4	Juveniles	3 – 5	90 – 150
5	Yearlings	< 3	< 90

*This size class includes adult females (females over 9 ft / 2.7 m) and sub -adult males with no ghara in as yet unknown ratios (there is no existing data on the sex ratio of wild gharial populations)

Garmin ETrek Summit Handheld GPS receivers were used for recording survey routes and locations of special events in pre-determined UTM coordinate system (Zone 44, Northern Hemisphere, WGS-84). Survey distances traveled were measured with Global Mapper software by connecting GPS waypoints recorded along each survey route. **(Note: This method records simplified survey routes for future depiction in maps compared with the more complex routes in the field and underestimates actual distance traveled).** Sub-populations were assessed and identified as per the local name of location they were found in. **2) Phase II: Identification of Nesting Sites** – Identification of nesting sites was undertaken by searching for signs of nesting activity and nests/eggs in late March and upto late April, which is the most frequently reported nesting period of the species in many parts of its range. Nest searches were conducted by observing female spoor on likely nesting habitat and trail nesting activity. The GPS locations of sites that showed signs of nesting activity were recorded. and 3) **Phase III: Post Nesting Survey** – Verification of the actual occurrence of nests at these identified sites was conducted by returning to these sites which were searched delicately with 2 mm (dia) steel probes as well by digging in the sand up to 45 cm every 30 cm apart at those sites which had most intense activity. During these visits, the sites were searched for residual egg shells that remain at nest sites excavated by either females or predators.

Results

Within CTR, a total of 101 individuals were observed during 2008. The size class distribution was 42 adults, 47 subadults, 10 juveniles and 2 yearlings. The CTR gharial metapopulation is distributed into 6 spatially discrete sub-populations:, the Dhikala/Phulai sub-population (n=70), the Ramganga (upstream of Gethiarao) sub-population (n=8) , the Gaujeda sub-population (n=5), the Palain River sub-population (n=7), the Sonanadi River sub-population (2), and the Buxar sub-population (n=4). A total of 10 adult males (with gharas) were observed during this study distributed in 5 of 6 subpopulations; the absence of an adult male at Sonanadi is likely due to the brief survey conducted there (only 2 individuals were observed). Mugger crocodiles co-occur with gharial at all six localities surveyed (Table No. 2).

Table No. 2: Consolidated Estimate of gharial observed in CTR and their distribution

S. No.	Place	Adult Male	Adult*	Sub-Adult	Juvenile	Yearling	Total
1	Dhikala	2	16	42	8	2	70
2	Palain	1	4	2	0	0	7
3	Sonanadi	0	2	0	0	0	2
4	Gaujeda	2	3	0	0	0	5
5	Boksar	1	3	0	0	0	4
6	Ramganga (between Ghetia Rao and Gairal)	1	2	3	2	0	8
7	Miscellaneous sightings not associated with any sub-population	3	2	0	0	0	5
Summary of gharial observed in CTR		10	32	47	10	2	**101**

*** includes both adult females and subadult males in unknown ratios**

Evidence of recent successful reproduction is indicated by the presence of young individuals and/or recent nesting at all six localities. Direct confirmation of reproductive activity in 2008 is evidenced by observations of recent nesting activity, nests, and/or predated nests distributed amongst 40 sites at five of the six localities (excluding the Ramganga subpopulation) (*Appendix I)*. At the Palain River locality, one exposed nest (10 eggs) was relocated to a makeshift incubation facility and produced 6 hatchlings, 5 of which survived for release.

Discussion

In the present study, we document that the gharial population at CTR consists of more than 100 individuals of representative age/size classes distributed among at least six subpopulations. At CTR, gharial survive and reproduce in the man-made reservoir habitat and have apparently adapted to the water fluctuations associated with hydro-electric dam operations. This feature distinguishes the CTR gharial population from those at Katerniaghat Wildlife Sanctuary and the National Chambal Sanctuary which are primarily free – flowing river systems and where water level fluctuations are related primarily to water management and irrigation. Unlike these latter two localities, the CTR population has not been subjected to repeated releases of head-started gharial within the last 14 years, and may harbor one or more genetically distinct subpopulations of the original CTR population. At CTR, nesting success appears to be adversely affected by water level fluctuations in the reservoir, limiting available nest sites and producing horizontal and/or vertical separation of the nests from the proximity of water due to receding water levels within the main reservoir. In addition, cattle disturbance and/or nest predation may further limit nest success.

This study establishes the CTR gharial population as one of the three remaining most important breeding populations within India. It documents that the gharial has adapted successfully to the recently formed reservoir habitats, a feature which distinguishes this population from the other two main breeding populations in Katerniaghat Wildlife Sanctuary and the National Chambal Sanctuary. In contrast to these, the CTR is well protected from anthropogenic pressures due to its status as one of the premier tiger reserves in India and is frequented by large numbers of visitors each year.

Recommendations

The current study was not designed to establish the biology and ecology of gharial in CTR in detail. This will require extended work because of the drastic changes that have taken place in the habitat parameters and the lake-like environment here being very dynamic.

Considering the condition of most gharial rivers in the country, the ability of the species to utilize reservoirs needs to be fully explored. Research on the species in Corbett Tiger Reserve would prove beneficial for the species particularly in the context of reintroduction of gharial into lake – like environments as Corbett Tiger Reserve is the only protected, undisturbed reservoir harboring a breeding population of the species in the country.

Further studies of the CTR gharial population should be conducted to 1) identify present constraints on successful reproduction, 2) establish the population distribution and abundance, and 3) document the seasonal habitat use by gharial at each of the six localities.

Appendix I

Palain River

S.No.	Date	GPS Location	Type of Activity	Age of spoor
1.	10/4/08	E 78.76347 N 29.59898	Climbing	Fresh
2.	10/4/08	E 78.75426 N 29.61528	Egg laying; Clutch of 17 exposed eggs found on 10/4/08	Fresh – less than 12 hours old
3.	10/4/08	E 78.75526 N 29.61353	Trial Nesting, (site of relocation of exposed eggs found above)	Fresh
4.	17/4/08	E 78.75337 N 29.61242	Climbing	Fresh
5.	17/4/08	E 78.75609 N 29.61140	Climbing	Fresh
6.	17/4/08	E 78.76130 N 29.60554	Climbing	Fresh
7.	17/4/08	E 78.76283 N 29.60425	Climbing	Fresh
8.	17/4/08	E 78.76321 N 29.60081	Climbing	Approximately 2 days old
9.	17/4/08	E 78.76331 N 29.59912	Climbing	Approximately 2 days old

(a)Dhikala

S.No.	Date	GPS Location	Type of Activity	Age of spoor
1.	16/4/08	E 78.85442 N 29.60550	Climbing	Old - One week
2.	16/4/08	E 78. 85246 N 29.60492	Climbing	Fresh – 1 to 2 days old
3.	23/4/08	E 78. 84191 N 29.59649	Climbing	3-4 days old
4.	23/4/08	E 78. 83750 N 29.59764 to E 78.83697 N 29.59789	Climbing	2-3 days old
5.	24/4/08	E 78.84435 N 29.84435	Climbing	2-3 days old

Boksar

S.No.	Date	GPS Location	Type of Activity	Age of spoor
1.	11/4/08	E 78.77833 N 29.53995	Climbing, Trial Nesting	Fresh
2.	11/4/08	E 78.77898 N 29.54005	Climbing, Trial Nesting	Fresh
3.	11/4/08	E 78.77661 N 29.55450	Trial Nesting	Fresh
4.	11/4/08	E 78.78094 N 29.55237	Trial Nesting, Climbing	Fresh
5.	11/4/08	E 78.78129 N 29.55148	Trial Nesting, Climbing	6-7 days old
6.	11/4/08	E 78.77779 N 29.54998	Trial Nesting Climbing	Fresh
7.	11/4/08	E 78.77802 N 29.54834	Climbing	Fresh
8.	11/4/08	E 78.77881 N 29.54710	Climbing	4-5 days old
9.	12/4/08	E 78.77823 N 29.54782	Trial Nesting, Climbing	Fresh
10.	12/4/08	E 78.77213 N 29.54099	Trial Nesting Climbing	6 – 7 days old
11.	12/4/08	E 78.77325 N 29.53919	Climbing	6 – 7 days old
12.	14/4/08	E 78.77604 N 29.55490	Climbing	Fresh
13.	14/4/08	E 78.77761	Trial Nesting,	Fresh

(a)**Sonanadi River**

S.No.	Date	GPS Location	Type of Activity	Age of spoor
1.	13/4/08	E 78.67690 N 29.60853	Trial Nesting, Climbing	Fresh
2.	13/4/08	E 78.67690 N 29.60990	Climbing	Fresh
3.	13/4/08	E 78.67747 N 29.61055	Climbing	Fresh
4.	13/4/08	E 78.67832 N 29.61109	Climbing	Fresh
5	13/4/08	E 78.67940 N 29.62272	Climbing	Fresh
6.	21/4/08	E 78.74103 N 29.57415	Climbing	6-7 days old
7.	21/4/08	E 78.68074 N 29.57415	Trial Nesting, Climbing	3 – 4 days old

(a)**Gaujeda**

S.No.	Date	GPS Location	Type of Activity	Age of spoor
1.	14/4/09	E 78.82661 N 29.60271	Trial Nesting, Climbing	2 to 3 days old
2.	17/4/09	E 78.83674 N 29.60889	Climbing	2 to 3 days old

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Dependency of local people on the Corbett Tiger Reserve, India

*Ruchi Badola[1], Tripti Sah[2], Syed Ainul Hussain[1,3]

Abstract

In developing countries, particularly those with high densities of population such as, India, protected areas closely impact the livelihood of local communities living in and around park. The benefits of protected areas may accrue to a party that is not particularly disadvantaged while compromising an already marginalized resource dependent group, resulting in potentially negative conservation outcomes if their needs are ignored. It is therefore important to understand the different resource user groups in a community and their dependency on the natural resources. Using a questionnaire based survey, the present study was conducted in six villages located around the Corbett Tiger Reserve to examine the socio-economic status of local community living in and around its Buffer zone and to quantify their dependency on forest resources. Situated at distance ranging from 0-3km from the Tiger Reserve boundary, some villages lack even the basic facilities such as electricity and drinking water. The economy of this area is basically agrarian. In all the villages more than half of population is involved in agriculture either fully or with some occupation. The people are poor, the mean household income ranges from Rs. 18240±7497 to Rs. 32558.5±8123.9 per year, and depend on the forests for fuelwood and fodder requirements. Some families also collect medicinal plants and Non Wood Forest Products. The contribution of forest to per capita income ranges from 38.07% to 51.1%. The local people bear the costs of conservation in terms of opportunity costs and loss of life and property due to wild animals. It is therefore imperative to address their livelihood concerns while developing conservation management plans for the area.

Introduction

Without the many ecosystem services provided by forests, life would not have been possible on this planet (Krieger, 2001). Changes in the quality and quantity of natural forest ecosystem have a great impact on human welfare. Such changes would include both the small changes at large scale and large changes at small scale. For example, change in the global gaseous composition by even a small amount may result in large scale climate change that will affect the viability of and welfare of global human population. Large change at small scale include reduction in the local forest composition which may drastically alter the terrestrial and aquatic ecosystems, having an impact on the benefits and costs of local human activities (Costanza *et al.,* 1998). It is in fact their important economic and ecological roles that have made forests highly contested spaces. Patterns of resource dependence emerge in a variety of settings, but primarily involve communities in which economic activity revolves around capitalizing on key features of the local natural environment (Mekbeb *et al.*, 2009). Though more and more people are now aware of the significance of forests in human wellbeing, the forests are continuously declining. The rising human population has put undue pressure on forests for fulfilling a variety of demands.

India has a large number of PAs which correspond to International Union for

1&3 Wildlife Institue of India P.O Box 18 ruchi@wii.gov.in, hussain@wii.gov.in
2 ACF, Bankura North Division West Bengal Triptisah16@gmail.com

Conservation of Nature (IUCN) categories II, IV, and VI and cover 4.90% of the country's land area (WII Database Cell, 2011). The first among these is Corbett National Park. In developing countries, particularly those with high densities of population such as, India, protected areas closely impact the livelihood of local communities living in and around park. In turn, they are also affected by the continued existence of local people's right, arising out of a continuation of conventional arrangements (Chopra, 1998). Although a PA may accrue a 'net gain' for society, the benefits may accrue to a party that is not particularly disadvantaged while compromising an already marginalized group (De Lopez, 2003; Guha, 2003; Vasan, 2007). In such situations, marginalized groups often depend on the natural resources found in PAs for their livelihoods, resulting in potentially negative conservation outcomes if their needs are ignored. It is therefore important to understand the different resource user groups in a community and their dependency on the natural resources. The study of dependency of locals on the natural resources is a complementary aspect of interdisciplinary studies, which help in identifying the various economic groups of a community and their biomass requirement (Badola & Silori, 1999).

The present study was conducted in the villages around the Corbett Tiger Reserve (CTR) to examine the socio-economic status of local community living in and around the Buffer zone of CTR and to quantify their dependency on forest resources.

STUDY AREA

CTR is situated in the ecologically important Bhabar-Terai Region, a strip of land skirting the southern part of the Shivalik Mountains in northern India. It is located in the Kumaon and Pauri-Garhwal Regions of Uttarakhand State in the foothills of the Central Himalayas. The geographical extent of the area is from 78°05'E to 79°08'E longitude and 29°25'N to 29°48'N latitude. CTR, comprises of Corbett National Park (520.82 km^2), Sonanadi Wildlife Sanctuary (301.18 km^2), and a buffer zone (466.32 km^2). The vegetation of the area is a mosaic of dry and moist deciduous forest, scrub savannah, and alluvial grassland. The park is home to rich and diverse fauna, that include a high density of tigers (*Panthera tigris*) and a sizeable population of Asian elephants (*Elephas maximus*).

Village location with respect to the park

There are about 92 villages located around the CTR out of which, 42 are located in the Ramnagar Forest Division and the rest 50 in the Kalagarh Forest Division. The villages fall under Bijrani, Sarapduli, Kalagarh and Dhela ranges of Ramnagar Forest Division and Jhirna, Adnala, Maidavan, Mandal, Sonanadi and Palain ranges of Kalagarh Forest Division. 51 villages constituting about 60% of the total area situated at a distance of <1.5 km from the Tiger Reserve.

Village ecosystem

Agriculture is the main occupation in the area but the productivity is low. Agriculture is characterized by small and fragmented holdings. Farmers still employ old agricultural practices. Only a few farmers have tractors of their own. The owners rent out tractors for tillage and other cultivation works. Irrigation is by canal system or rain dependent. *Kharif*

(March-September) and *Rabi* (October-March) are the main cropping seasons. Wheat is the main *Rabi* season crop while paddy and maize are the main *Kharif* season crops. In some villages cash crops like soya and ginger are also grown. Vegetables are cultivated but it is mostly for self consumption. Only the large scale farmers sell their extra produce in the market. Fodder crops like *chari* and *berseem* are cultivated by farmers who have larger land holding. Most male members migrate to bigger cities in search of jobs therefore females play a major role in all agricultural works. Use of livestock dung as manure is the major land improvement measure adopted in the area. In some villages farmers have started using chemical fertilizers like urea.

Major issues related to people forest interactions

Park's impact on people

(a) ***Crop damage:*** Agriculture is the main occupation of people residing in the area. There is a high intensity of crop damage in the areas which are immediately adjacent to the park boundary. Wild animals like, sambar, chital, hog deer, wild boar, porcupine, monkeys and elephants raid the agriculture crops in the areas near to Reserve. Though electric fencing has been done in some villages but either it is not working or is ineffective. Compensation is paid for damage done by elephants only. Most of these incidents of crop damage are reported in the southern part of CTR where 50% of the population resides and where cash crops like sugarcane are cultivated.

(b) ***Human-animal conflict:*** The villagers in the vicinity of forests are facing the problems of crop raiding, cattle kill as well as human predation by the wild animals. The angry villagers often retaliate against the loss of their cattle by putting insecticides in the carcass of cattle killed by tiger. Human life loss has also been reported in tiger and bear attack.

(c) ***Lost access to resources:*** The PA's are managed on core- buffer strategy. No rights and concessions are entertained within the National Park boundaries, which constitutes core of the reserve. In the buffer, restricted activities are allowed. People inhabiting these areas are poor and dependent on the forest resources for fodder and fuel wood. They usually have high energy requirements with forests as their only source. Formation of Tiger Reserves has restricted the resource use. With no other alternative resentment there is in the villagers against CTR.

People's impact on Park

(a) ***Habitat degradation:*** The over-exploitation of forests for meeting fuel wood and fodder requirements has resulted in habitat degradation. Firewood and fodder, being the most significant resources extracted out of the forested areas, are regarded as the principle causes of disturbance and degradation within forests, beside forest loss to agricultural expansion. Further, non-timber forest products contribute significantly to the household economy, leading to conflicts with wild animals throughout the area.

(b) ***Poaching:*** Poaching incidents have also been reported in the study area. Animals are killed for various body parts. Hunters and poachers use variety of snares, poison water holes, electrocute and kill using poison arrow. Forest guards are poorly equipped for dealing with the problem.

(c) ***Pesticide pollution:*** Pesticide poisoning is posing a major threat to wild life, aquatic life, and birds of prey like the Peregrine Falcon and Grey Headed Fishing Eagle, in Reserves like, Corbett. Pesticide pollution is caused mainly by run-off of agrochemicals used in nearby fields into the rivers flowing through Reserve area. In Corbett, traces of corroded materials like steel, which were used in the construction of Kalagarh dam and later submerged water have been found in aquatic animals. Presence of organo-chlorine pesticides has affected the reproductive success of some birds due to egg shell thinning.

METHODOLOGY

Six villages viz. Chukum, Kunkhet, Mohan, Ringora, Teda and Dhela, were selected for intensive study considering their location, demographic characteristics and accessibility. Due to shortage of time and accessibility none of the villages from Kalagarh Forest Division were selected for study. In the second stage, 15% of the housing units from the selected villages were picked up randomly for carrying out intensive household and attitude survey. Care was taken to evenly distribute households over the total village area so that there is full representation of all castes and communities. It was also tried to get an intelligible mix of all age classes and gender for the attitude study.

A rapid village assessment was done in each village to get its general profile, prior to the questionnaire survey. In the Rapid Village Assessment, information like, demography, living standard (e.g. number of kutcha-pucca houses), livestock, land use and basic amenities available in the area such as, schools, healthcare, market, drinking water source etc was collected.

Household survey was conducted using a structured questionnaire. The first part of the questionnaire dealt with the socioeconomic profile and included questions on the demography, occupational pattern, average income, landholding, agricultural pattern, average crop yield, livestock *etc*. The second part dealt with determining dependency on forests for fuel wood, fodder and other NWFP's. It comprised of questions on fodder and fuel wood consumption pattern, their sources, number of visits made to the forest for fuel wood and fodder collection, approximate consumption per day, average head load size, time spent in forest for grazing, fodder and fuel wood collection, main and lax seasons and the main fodder, fuel wood species. The information on medicinal plant collection was also collected. The data collected was studied to make comparisons between all the six villages in terms of their socio-economic characteristic and resource dependency. Various descriptive statistics like frequency, percentage, mean, standard errors were used to make the comparison. The data was analyzed using Statistical Package for Social Sciences (SPSS) and MS Excel Data Analysis tool.

RESULTS

General characteristics of the sampled villages

Table 1 describes the general socio economic characteristics of the sampled villages. While Ringora and Dhela are located at the Reserve boundary, Chukum and Kunkhet are situated across the Kosi river at a radial distance of >3 km from the National Park in South-east direction. Mohan is situated to the south-east of Corbett National Park, at a distance of

>1.5 km. Teda is situated at a distance of<3 km from the Tiger Reserve and is across the Kosi. The number of households in the villages range from 34 in Ringora to 300 in Dhela while the family size ranges from 5 in Ringora to over 7 in Kunkhet. Rearing of cattle for drought and milk is common. Although most of the families in the study area own cattle, with 100% of the families in Chukum and Kunkhet owning cattle, the number of cattle owned per family is small, the number of milch cattle being even smaller. All the people in Chukum, Kunkhet, Ringora and Teda own agricultural land while more than 75% people in Mohan and Dhela have land for agriculture. However only 24-34% of the people are engaged exclusively in agriculture, only in Kunkhet this goes up to 67%. However, entire population is engaged in agriculture either fully or in combination with some other occupation, such as labour activities. Approximately 1/3rd population is employed in public or private jobs in addition to agriculture. Those who are doing private jobs are mainly employed in various hotels present in the area. These hotels employ workers during the tourist season. Mohan has the largest percentage of *Pucca* houses followed by Teda and Dhela. Except Mohan, Teda and Dhela the percentage of total electrified houses is low in other villages. Houses having their water connection was highest in Mohan, in Kunkhet and Ringora none the families have their own drinking water facility. The main source of drinking water is either Kosi river or the small *'sots'*.

Table 1: General characteristics of sample villages

Parameters	Chukum (n=15)	Kunkhet (n=12)	Mohan (n=12)	Ringora (n=5)	Teda (n=30)	Dhela (n=45)
Location with respect to & distance from park (km)	South east >3	South east >3	South east 1.5-3	Adjacent 0-1.5	South east 1.5-3	Adjacent 0-1.5
Total hh	95	80	80	34	200	300
Mean family size	6.9± 0.6	7.4± 0.8	6.9± 0.6	5.2± 0.8	6.5±0.3	6.6±0.5
Avg. cattle holding	3.2±0.6 (100)	1.3±0.3 (75)	3.08±0.6 (91.67)	4±1.4 (100)	4.13±1.0 (96.7)	3±0.3 (93.3)
Avg. land holding (ha)	1.13±0.2 (100)	0.7±0.3 (100)	0.53±0.2 (75)	0.40±0.2 (100)	0.9±0.1 (100)	0.9±0.1 (88.89)
People engaged in agriculture (%)	33.3	66.7	33.3	-	30	24.4
Pucca houses (%)	33.33	25	91.67	-	86.7	75.6
Mean annual income hh^{-1} (Rs)	22320 ±7763.2	10300 ±2478.1	32558.5±8 123.9	18240 ±7497	30816 ±6029.2	27591.1 ±2755.4
Houses electrified (%)	33.3	33.3	83.33	-	86.6	75.6
Drinking water connection (%)	13.3	-	91.67	-	3.3	28.9
People literate (%)	60	83.3	58.3	80	66.7	73.3

Figures in parenthesis give % of people with cattle and land; hh-household

Income categories were formed considering income from other occupations and sale of agriculture goods. Forest contribution in form of fuel wood, fodder, small wood and

consumed agriculture produce was not considered as there is no direct contribution to the family income. Four income categories were formed viz: (i) <10000 (ii) 10-30000 per annum (iii) 30-50000 per annum and, (iv) >50000 per annum. Majority of population is dependent on agriculture and labour and their annual income was found to be very low (Figure 1).

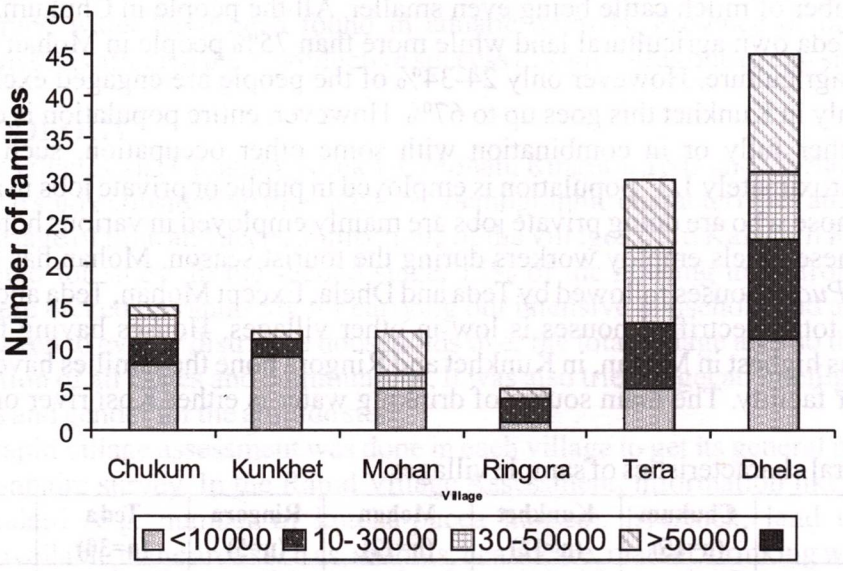


Figure 1: Number of families under different income categories in sample village

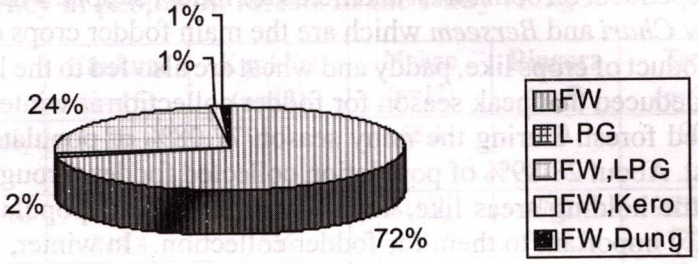
Dependency on forest resources

The study area has majority of its population living in rural areas and dependency on natural resources is a common phenomenon. From the responses of people it is revealed that both human and cattle population remains dependent on forest resources throughout the year. Villagers collect fire wood for rainy season in advance. In addition to fire wood they also collect fodder from the forest area. In some villages rights and concessions are given to the locals, under which they are allowed to collect some quantity of small wood for construction purpose. Few families are also engaged in gathering other non-timber forest produce especially medicinal plants from forest which are sold to IMPCL factory or in the Ramnagar market.

Fuel wood consumption

Fuel type: The fodder or fuel wood is brought as headloads, which are locally called *'sirbojh'*. As much as 72.72% of population is dependent only on wood as a source of fuel,and more importantly none of them are buying it from outside. Fuel wood is brought in head loads from the forests. Very few families in the study area use LPG (1.68%) or any other fuel. Some families (approx 25%) are using fuel wood in combination with other means like, LPG and kerosene (Figure 2). However, even in such cases the fuel wood consumption is greater in comparison to other fuel type. The main reason for higher fuel wood consumption is its easy

and free availability. In some villages though the LPG connections have been provided to the villagers they are not using them, or have given it to someone else for use. The reason behind this is their poor financial condition. The villagers are incapable of spending as much as Rs.300 per cylinder when they can easily get fuel wood free.



FW-fuel wood, Kero- Kerosene

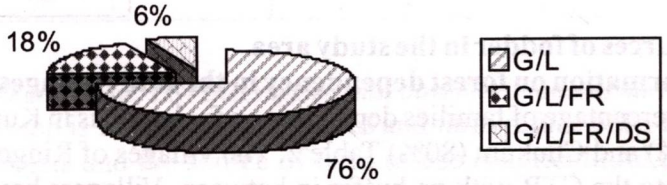
Figure 2: Fuel consumption pattern in the study area

Fuel wood species: Though locals make use of all fallen branches and twigs. The main fuel wood species are *Dalbergia sissoo* (Shisham), *Acacia catechu* (Khair), *Lagerstroemia parviflora* (Saaj), *Aesculus indica* (Kanor), *Oogenia oojenensis* (Sandan) *etc.*

Fuel wood collection from forest: At least one member of the family visits the forest daily. Mostly the female members are responsible for this. But, in some households even the male members and children go to the forest for fuel wood collection. One head load of fuel wood weighs as much as 35-40 kgs to as less as 10-15 kgs. The frequency of forest visits is more during winter season and less during rains. Winter forms the peak season of fuel wood collection as most of the families collect fuel wood in advance for rainy season and the hot summer months. One head load can be finished in less than one day to almost three days depending on the family size.

Fodder consumption pattern

Fodder type: The mean cattle holding of study area is >3 cattle per household. Most of the families own local *Pahari* breed. The cattle are fed with grasses, leaves and farm refuse, consisting of by-products of paddy and wheat. Dietary supplements are not affordable for most. Only better off farmers and those involved in dairy business buy diet supplements for their cattle (Figure3). Their percentage is a mere 24.42%. Even in these cases it is given only to milch animals.



G-Grass, L- Leaves, FR- Farm refuse, DS- Diet supplements

Figure 3: Types of fodder used in the study area

Fodder types: Villagers collect both grasses and tree fodder from the forest. Especially in winter, the fodder is mainly collected from trees by lopping. Beside these the villagers collect

leaves of many broad leaf species as fodder. It is used in winter when no grasses are left on ground.

Fodder source: Forest and fields form the two main sources of fodder for half of the population (49.55%) major portion of the demand is fulfilled from the forests. About 34.23% of population is dependent on both forest and fields for fodder supply. Villagers having larger land holding grow *Chari* and *Berseem* which are the main fodder crops of *Kharif* and *Rabi* season. The by product of crops like, paddy and wheat are also fed to the livestock. From the responses it was deduced that peak season for fodder collection is winter when as many as 60% people visited forest. During the rainy season 77.08% of population did not collect fodder from forest. About 28.89% of population collected fodder throughout the year. This was in higher cattle holding areas like, Teda where 80.95% of population stated that all seasons are equally important to them for fodder collection. In winter, the main source of fodder is broad leaf trees. Only a few farmers (6.31%) buy diet supplements from the market. Sometime it is made available to them by the dairy where they sell milk.

Grazing

Most people do not take their cattle to forest for grazing instead stall feed them because of fear of wild animals. However, fodder for stall fed cattle comes from forest only. Most of the time villagers stall-feed their milch cattle and only non-milch ones are sent to forest. One member of the family usually accompanies the cattle to forest though in certain cases the cattle are sent on their own. In some villages like, Teda and Dhela a man has been employed to take the cattle to forest. In villages which are just adjacent to the National Park the number of stall fed animals is more. Ringora and Dhela are such two villages in our study which are adjacent to National Park with no buffer zone in between. This is because the forest officials do not allow domestic animals to graze in forest. Any domestic animal found killed in Park area is not compensated for.

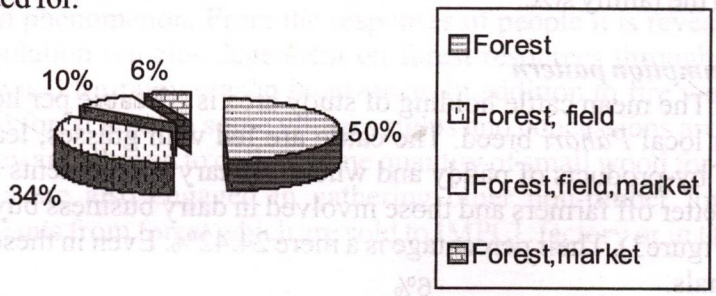


Figure 3: Sources of fodder in the study area

Detailed information on forest dependency in the study villages

The highest percentage of families dependent on fuelwood is in Kunkhet (91.67%), followed by Teda (90%) and Chukum (80%) Table 2. The villages of Ringora and Dhela are situated just adjacent to the CTR with no buffer in between. Villagers have no other forest to meet their requirements. They are forced to visit the Park Forest not only for collecting fuel wood but also for grazing cattle. The villagers are neither allowed to collect small wood from forest nor the extraction of medicinal plant species allowed. The dependency on forests is therefore less in these villages. The annual fuel wood consumption per household ranges

from 4742±2103.17 kg in Ringora to 11752±1554.9kg in Kunkhet. Contribution of fuel wood to total fuel requirement is 97.5±2.5% in Kunkhet and the lowest is in Ringora 60±19% (Table 2).

Table 2: Dependency of people on forests in the study villages

Fuel type	Chukum (n=15)	Kunkhet (n=12)	Mohan (n=12)	Ringora (n=5)	Ted a (n=30)	Dhela (n=45)
hh using only fuelwood (%)	80	91.7	58.3	20	90	62.2
fuelwood consumption $hh^{-1} yr^{-1}$ (kg)	9984± 843.8	11752± 1555	8112± 775.7	4742± 2103.2	9651.2± 720.4	7654.4± 822.5
Fuelwood as % of total fuel consumption	95.3± 2.6	97.5± 2.5	82.5± 6.6	60± 19	93.7± 3.1	84.7± 3.8
Fodder types used and sources of fodder						
G/L/FR (%)	100	77.8	81.8	100	69	50
G/L/FR/DS (%)	-	22.2	9.1	-	31.0	35.7
G/L (%)	-	-	9.1	-	-	14.3
Sources of fodder						
Forest (% families)	100	100	-	20	100	2.4
Forest/field	-	-	100	80	-	54.8
Forest/field/ market	-	-	-	-	-	26.2
Forest/ market	-	-	-	-	-	16.7
Fodder consumption $hh^{-1} y^{-1}$ (kg)	9920± 932.9	8400± 1833.0	7400± 1123.3	8400± 2683.3	8440± 522.5	6560± 640
Families grazing cattle in forest	63.33	33.33	54.54	80*	38.97	50
Families collecting medicinal plants (%)	-	8.33	-	-	13.33	-
% c ontribution of forest to per capita	48.9	51.1	38.97	45.9	41.76	38.07

G= Grasses, L=Leaves, FR=Farm refuse, DS=Diet supplements; direction is towards the riverside

Most of the cattle population is fed on grasses, leaves and farm refuse only. For the former they are dependent on forests and the source of farm refuse is agricultural by products of paddy and wheat. The dependency on forests is observed throughout the year though the intensity varies. It is more during winter and reduces during rainy season when grass is present in fields. Few people give some diet supplements to their cattle along with grasses, leaves and farm refuse (Table 2). The diet supplements are bought from market. However, it was noticed that most cattle owner feed supplements only during milch period. In Chukum,

Kunkhet and Teda 100% people depend exclusively on forests to meet grass and leaf fodder requirements while this is negligible in Mohan, Ringora and Dhela where forest fodder is also supplemented with agricultural byproducts (Table 2). None of the households in the villages buy fodder from outside except in Dhela. Few families grow *chari* and *berseem* in their fields during their respective seasons but the amount is negligible.

The highest fodder consumption per household per year is in (Chukum 9920±932.9) while the lowest is in Dhela (6560±64). Although the highest % of families grazing their cattle in the forest was found to be in Ringora (80%), these cattle were not taken into the Tiger Reserve but towards riverside. People who are usually having just one animal do not take them into the forest to be grazed. Medicinal plant collection was found only in Kunkhet and Teda. The harvesting is done not only for personal use but it is also sold to the medicinal factory in Mohan.

The fuel wood and fodder amount extracted from forest was converted to monetary values by multiplying it with market price of fuel wood and fodder. It was taken to be Rs. 50-26 kgs of fuel wood and Rs. 25 for same amount of fodder. The contribution made by forest to per capita income was found to be highest in Kunkhet while it was lowest in Dhela (Table 2). The contribution from forest in total per capita income in Ringora was 38.97% which is quite high considering people have been provided with LPG. Its use however, has been restricted to preparing tea most of the time.

DISCUSSIONS

Protected areas generate significant economic, environmental, and social benefits (Myers 1990; Dudley and Stolton 2005). These benefits are realized at local, national, and global levels. However, people living in and around PAs, while deriving little benefits from conservation, pay enormous costs in terms of lost access to their life-support system, particularly in developing Third World countries (Wells 1992; Brockington 2002). Unless the costs of conservation are assessed and it is clear who pays these, conservation interventions will not be effective.

The economy of CTR is basically agrarian. In all the villages more than half of population is involved in agriculture either fully or with some occupation. After agriculture the next major employment providing sector is service (both government and private jobs). In some villages tourism has opened source of employment for local youths, who get employment in hotels during tourist season. Most villagers own cattle, which are reared mainly for draught and milk purpose. A functional dairy in Teda accounts for its highest mean cattle holding. The presence of this dairy has benefited as many as fifty families in the area who now supplement their income from it. Though the mean cattle holding per family is good, but the numbers of milch animals is less. Badola (2000) pointed out that large number of low yielding and moribund cattle are kept by the villagers because they do not spend much on animals. The basic picture that emerges from socioeconomic survey shows that people of the study area are poor. Agriculture land appears to be the only basic productive resource in the area. However its output being low, the contribution to total income of people is also low. Majority of population has small land holdings and has to take up other occupation to meet the family requirements.

In a country like India where almost 75% population lives in rural areas, the dependency on natural resources is a common feature, since their biomass needs are fulfilled from the local vegetation (Badola & Hussain, 2003). Imposing National Parks on rural communities have a number of negative consequences, including restriction of access to traditionally used resources. These situations arise largely due to lack of clear cut understanding of the needs, resource use pattern and aspirations of the local people due to lack of dialogue and trust between local people and forest department. According to Badola (1998), dependence of people on the forests is due to lack of alternatives to the forest resources, inability of people to produce alternatives from market and in some cases it is 'habitual' or 'traditional'. Residents of all the six villages were dependent on forest for fuel wood and fodder. However, in Ringora and Dhela, the two villages adjacent to core of CTR, small wood collection from forest was not done. Earlier these two villages had rights for extraction of small wood from forests but, with the declaration of CTR all that has been stopped. This has generated resentment and hostility in villagers against the Forest Department and Tiger Reserve. Fuel wood collection is also a result of easy and free availability of fuel wood from the Reserve Forest.

The extraction of fuel wood and fodder for commercial purposes was not recorded in the study villages. However, people from Ramnagar city do come and collect fuel wood for selling in market. This aspect of forest use should be studied and dependency of outsiders on forests should be analyzed. Although a low percent of cattle were sent for grazing, fodder for stall fed animals came from forest and fields only. The land holding in villages was not large enough to use it for growing fodder crops along with agriculture. The study revealed that livestock of study villages remain dependent on forests throughout the year. Usually the animals sent to forest were accompanied by a family member but in some cases they were left in the forest on their own. The livestock was left in forest for hours and so it is essential to study the changes in vegetation, soil structure, regeneration rate to determine the effect of grazing on forest ecosystem.

The findings of this study suggest that people of study villages are dependent on forest resources because of economical, locational, social and cultural factors. A long term sustainable alternative, to biomass resource, can be suggested only after carefully scrutinizing the factors influencing dependency of local people. Thus it is it is imperative to identify different resource use groups of a community with varied requirements and dependency. According to Badola & Silori, 1999, suggesting modern alternatives for traditionally used fuel wood may not always be an appropriate measure keeping the location of village in mind. But, it is noteworthy to keep in mind that the use of alternatives will certainly reduce the forest dependency if not fully eliminate it. It is important to take into account the socio-cultural acceptability and viability of the suggested alternatives in designing effective alternatives to natural resources for local people (Leach & Mearns, 1991). Merely imposing prohibition on resource use is not effective for conservation of forest resources.

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Dudhwa National Park As I Knew It In 1950.

*D.N. Misra

I passed out from the IFC in April 1950 and was posted to the North Kheri Forest Division. I reported to the head office at Lakhimpur Kheri where I submitted my joining report. I was told that the DFO was out on tour and that I should proceed to Dudhwa. The head clerk also told me that the dak runner would be leaving for the same place and that I should accompany him. The train left Lakhimpur at night and I had to change the train at Mailani. The train for Dudhwa left at about four in the morning and I reached there around seven. At Dudwa station I was informed that the DFO was at Bellaraen and that I could leave my baggage at Dudwa Station and proceed to Bellaraen by the same train. My baggage would be transported to Dudwa FRH by the forest staff. I was also informed that I could catch the same train on its return journey in about two hours – enough time to pay a visit to the DFO at Mailani FRH and return to the station to catch the train. I was also advised to carry my cycle with me so that I could use it between the station and the FRH.

I got down at Bellaraen station and cycled down to the FRH hoping to catch the DFO before he left on inspection. However, when I reached the FRH the DFO, Mr. Jain, had already left for inspections. Mrs. Jain was in the FRH and she offered me breakfast. I had to wait for the DFO's return and Mr. Jain came back around 1.30.p.m. I met him and he invited me to lunch Mr. Jain also advised me to rest for the day as there was no train to Dudwa that day. I told him that I had no luggage and no clothes and that I had to return to Dudwa in any case. I had my cycle with me and that if I could get a map of the division I could easily cycle down to Dudwa. After all persuasion by the DFO and Mrs. Jain failed I was supplied a map of the Division and the range staff was instructed to keep a lookout for me and to keep the DFO informed of my progress through their ranges. There was a forest telephone line and we had ringer type phones in the ranges and rest houses. I left the Bellarain FRH at four in the afternoon and cycled down to Dudwa – a distance of 19 miles or so. I was offered tea and snacks at Sonaripur Range Quarters and reached Dudwa FRH by about 6.30 in the evening. The journey was uneventful.

The North Kheri Division was a compact area and could easily be managed by a cycle. The touring season lasted from the end of the rains – say end of September to the beginning of the rains next year- end of June or so. For the next season I had bought an old 1934 model Ford tourer. In those days there was no road bridge on the Sarda river and cars had to be loaded on to a railway wagon at Mailani and unloaded at Dudwa railway station. For the eight months from October to June one remained confined to the forests of North Kheri Division. Daily newspapers and other necessities were transported from Lakhimpur by a team of Dak runners.

During those days the wild life in the division was phenomenal. There were several patches of grasslands scattered in various ranges – called locally " Phantas". The grasses were thick and tall and one could negotiate them only on an elephant back. Controlled burning of these phantas was done in the month of February – March. With the sprouting of the greases after the burn the whole areas became the grazing grounds of the deer families. While on a tour of Sonaripur range one afternoon, as I was crossing one such phanta I

*Ex PCCF U.P, 'Amrapali', B-155, sector –A, Mahanagar, Lucknow- 226006

noticed a small movement beneath the Sal trees growing around the boundary of the phanta. I stopped my car and a close examination revealed magnificent specimens of male chitals waiting for the sun to go down to enter the phanta to graze on the succulent sprouts. It was difficult to estimate their number so I clapped and there was such a stampede all around the boundary of the phantas that their number could not have been less than a thousand. I have visited these areas after they have been constituted into a National Park but there has been a severe decline of the numbers of the deer family. There is no commercial exploitation in the area and hence there is no break in the thick unpalatable undergrowth in the forests. There is a severe decline of the grazing grounds for the deer family which is reflected in the decline of the deer population. It is bound to have an adverse impact on the population of the predators.

There is an incident of my early days in the North Kheri Division which I have not been able to forget till today. It was the month of May and my Conservator of Forests – Sri J.R. Singha was on a tour of the Division. I was sitting with him in his car at the back. As we were crossing the Sonaripur Phanta a magnificent specimen of male Chital crossed the road a little ahead of our car. Mr. Singha gave me his gun and asked me to shoot the Cheetal. I got down from the car and taking aim I fired. The shot hit his spine and he sank to the ground on his hind legs making frantic efforts to stand and escape from the spot. Unfortunately, his spine was broken and he could not do so.I was ordered to finish it off and I approached it to take a shot at his head. The sight that greeted me was the one that I have been unable to forget till today. The frightened eyes that looked at me and the vain efforts that he made to get up and escape, have troubled me ever since. However sorry I felt for the unfortunate creature the only thing to do now was to relieve him from the agony as quickly as possible. I took aim at his head and fired another shot, and he dropped dead.

There is another picture that lingers in my memory. Once while returning from an inspection I happened to pass through a phanta when I noticed some movement beneath the Sal trees on the far side of the phanta. I stopped my car and got out to investigate. I saw an unforgettable sight of a forest of antlers gathered at the fringe of the phanta. I gave a shout and there was such a stirring all along the semi-circle of the phanta that I estimated that the number of the male cheetals must be around a thousand. They had gathered to enter the phanta where the newly sprouted grasses were inviting them. I asked a senior colleague of mine why the assemblage had only male members and I was told that at a certain time of the year the males and females form separate groups.

I have visited the area several times after it was notified a national park but the sights and sounds of those early days have completely vanished. Part of the reason is that control burning of the phantas that produced new sprouts which provided grazing to the herbivores is totally banned. Also there is no felling operation in the forests which again opened up the forest canopy and created open spaces on the ground helping succulent grasses and shrubs to come up and provide food for the herbivores. The wildlife experts may not agree with what I have said but the fact that the wild life has had an adverse impact on it and that their numbers have dwindled is undisputable. Perhaps equilibrium would be established in time and maybe what we see now, after more than forty years of the establishment of the National Park may be the final picture of the Park. Rhinos have been introduced in the Park and they are flourishing. The only worry is about the tiger population. With the decline in the population

of the deer family the number of tigers it can sustain is limited and more and more tigers would have to find prey outside the park boundary, as is happening. They are increasingly migrating to the sugarcane fields in search of prey. It is for the wildlife experts to reflect upon and devise a way to conserve the tiger population in the national park.

While constituting national parks it is essential to keep in mind their past history and to devise ways to ensure that the existing fauna does not suffer because of the imposition of controls on the area. There was a time when shooting permits were issued in the shooting blocks and sportsmen like the Maharaja of Vizianagram used to arrange tiger shoots on a massive scale. Yet the tiger population did not suffer any permanent damage and the numbers were made up in a season or two. The primary reason for constituting Dudhwa National Park was to save and preserve the tiger population; unfortunately, the rules for managing the national park have militated against the very purpose of constituting the national park.

Similar is the story of the valley of flowers which too has been constituted into a national park. Before its constitution into a national park grazing was permitted and this kept the wild vegetation in control. As DFO North Garhwal I have had the occasion to visit this area several times and to photograph the flowers there. I have visited the area twice after its constitution into a national park and I have been greatly disappointed by the almost impenetrable tall grasses which prevent the sighting of the wild flowers which have given the area its name. Several visitors have complained that they had not been able to see the flowers for which the area has been known and is famous for. The rules for management of a national park must take into account its past history and practices that help and enhance those values for which the area is known. Putting restrictions that militate against the very values for which the area is known and which it is our intention to preserve and enhance does not make sense and is really counter productive. Let the wild life experts and enthusiasts ponder over these issues and devise methods of management of national parks that enhance and preserve their values for which they are known.

Cheetal News Section

About Corbett National Park Platinum Jubilee Issues.

In a brain storming session of Platinum Jubilee celebrations of Corbett National Park organized by Uttrakhand Forest department, it was decided to publish a special issue of Cheetal (A quarterly Journal of Wildlife Preservation Society of India) to commemorate the 75 glorious years of CNP. Articles & write ups were invited from experts, researchers & conservationists who have been associated with CNP. As a result of good responses form our members & experts it has been possible to bring out this special issue. Some articles concerning CNP from old issues of Cheetal have also been included in this issue. Readers are requested to send their views about this special issue which will be published in the future issues of Cheetal.

Corbett National Park Celebrates its Platinum Jubilee

Corbett National Park came into existence by a special National Park Act of UP Government on 8th August 1936. This is the first National Park of Indian Subcontinent which was named as Hailey National Park, as Malcolm Hailey, the then Governor of United Provinces was instrumental in its creation. Initially the area was 125 sq. miles. Jim Corbett played an important role in delineation of the boundary of the NP. FW Champlion, Divisional Forest Officer Kalagarh Forest Division was in charge of the Park form May 1937 to March 1940. The Park was named Ramganga National Park after independence but in 1955 after the death of Jim Corbett in Kenya, the park was named as Corbett National Park to honor the contribution of Corbett in setting up of the Park & his overall contribution to conservation.

The area of CNP was increased to 520.59 sq km by adding more areas in 1966. The ambitious post independence conservation programme "Project Tiger" was launched on 1st April 1973 from Corbett National Park. Sonanadi Wildlife Sanctuary & some adjoining areas of Ramnagar & West Tarai Forest Divisions along with remaining area of Kalagarh Forest Division were added to the CTR by the G.O of UP Govt. dated 11 June 1991 which increased the area of CTR to 1288.31 sq.Km.

Govt. of Uttarakhand is celebrating the Platinum Jubilee of Corbett National Park on completion of its glorious 75 years. The celebrations include an array of programmes starting from Feb. 2011 & to be continued throughout the year. A workshop on Tiger Conservation in Corbett landscape was held from 9th to 12th March 2011. Some prominent international conservation experts such as George Sheller participated in the workshop. A series of workshops & deliberations are being held on different themes like man-animal conflict, eco-tourism etc. The students, from schools adjoining CTR were given free entry in Dhikala Tourism zone. A large number of suggestions given by Operation Eye of the Tiger – India and other conservation NGOs & individuals are being included in the programmes during celebration of Platinum Jubilee.

Students from "Friends of Tiger Clubs" of Operation Eye of the Tiger – India visit CTR during Platinum Jubilee celebrations.

84 students & 15 teachers from 7 schools located around Corbett Tiger Reserves, who are members of "Friends of Tiger Clubs" run by Operation Eye of the Tiger – India (OETI) visited Dhikala Tourism zone during 2nd fortnight of Feb. 2011. The visit was sponsored by

OETI & facilitated by Corbett Tiger Reserve. Mr Manbar Singh Rawat of village Bandran (Almora) & Mr Mahendra Singh Negi of village Jhart Rathuwadhab (Pauri Garhwal) field Assistants of OETI accompanied & arranged the visit.

Shyamph Range of Haridwar Forest Division to be managed by Rajaji NP.

Syampm Range of Haridwar Forest Division, which is an important connectivity between Corbett & Rajaji has been included under the management of Rajaji N.P by an order of Uttarakhand state GOVT. While the legal status of the area will remain unchanged, the management by RNP will enable the spillover population of Wild animals to be managed scientifically under the management Plan of the P.A. This is being considered as an important step towards conservation of Wildlife & corridor management.

9. OCCURRENCE OF THE EASTERN MARSH HARRIER *CIRCUS AERUGINOSUS SPILONOTUS* KAUP IN CORBETT NATIONAL PARK: A RANGE EXTENSION

During March 1992, a juvenile Eastern Marsh Harrier *Circus spilonotus* was observed in Corbett National Park in northern Uttar Pradesh (29°31′ N, 70°41′ E). The harrier was frequently seen for 5/6 days quartering the open grasslands of the Dhikala Chaur and along the Ramganga river in the Park. Its identity was confirmed later by William S. Clark through photographs. Once treated as a race of the Western Marsh Harrier *Circus aeruginosus*, it is now considered a separate species (Amadon and Bull 1988, Howard and Moore 1991). The forests of the north central Sivaliks and Terai which were once contiguous are today disjointedly so with the forested foothills and Duars of the North-east, facilitating east to west movement of avifauna. The species breeds in the eastern central Asian steppes and winters in the Orient and Eastern India (Brown and Amadon 1968). It has not been previously recorded west of Assam (Ali and Ripley 1978). Therefore, the sighting in Corbett signifies an important range extension and the first record for the park. However, it needs to be determined over a period of time whether the species is a vagrant or a regular winter visitor to the north central Sivaliks. Two additional sightings in the Andaman Islands and at Periyar Tiger Reserve in Kerala (Eames 1991) need further confirmation and would greatly extend the southward range from the main north-eastern wintering grounds. Special thanks to Dave Ferguson of the U.S. Fish & Wildlife Service which funded the BNHS raptor project for infrastructural support, Mr R. S. Bhadauria, I.F.S., C.C.F. U.P. (Wildlife) who readily gave permission for field work and Mr A. S. Negi, Field Director, Corbett, who provided all facilities and to William S. Clark

January 22, 1993 RISHAD NAOROJI
Godrej Bhavan, Home Street,
Bombay 400 001,

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Observations on nests and nesting activities:

i) About twelve mounds of mud were present amidst the shallow water.

ii) Of these, about nine were clustered together, whereas others were located away from the cluster.

iii) The spot where the cluster of nests was located, was not densely covered with grasses, hedges or other macrophytic vegetation.

iv) Some of the nests were conical in shape while others were cylindrical. The shape of a few mounds was irregular. Depression at the top of the nests (concave and cylindrical) could not be seen because we did not approach the nests closely to avoid disturbance.

v) On nests, individuals were found either sitting, standing, displaying or busy shaping the nests.

Nest construction: Standing on top of the nest, the flamingo moved its beak on the top of the nest, describing an arc, it also moved its beak along the flank of the nest in linear up and down manner. To shape the nest with its legs, it would stand on top of the nest, the neck would be bent down so that the beak was brought in contact with the top of the nest. Then, with the beak as a centre (pivot) the bird would move the beak along the rim at the top. During this circular movement it was seen trampling or pressing down the top of the nest by raising its feet one after another.

About two to eleven individuals were present at Shahwadi on different occasions after the emigration of their colony (Table 1). One can rightly doubt that the individuals staying behind at Shahwadi, even after the departure of the colony, would breed at the site. However, from 13th August to 25th September, neither nest shaping nor breeding display were observed among these birds. They were remarkably silent and always busy feeding in the rapidly drying waters. They were always seen away from the nests. Moreover, the birds were absent on subsequent visits on 27th September and 10th November, 1992.

August 11, 1993 KETAN S. TATU
Research Student, Department of Botany, University School of Sciences, Gujarat University, Ahmedabad-380 009.

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9. CONTAMINATION IN EGG SHELLS OF HIMALAYAN GREYHEADED FISHING EAGLE *ICHTHYOPHAGA NANA PLUMBEA* IN CORBETT NATIONAL PARK, INDIA

A study of the breeding biology of resident raptors of Corbett National Park, Uttar Pradesh, India was undertaken during the years 1990 to 1993. The Park is situated in the lower Himalayan foothills known as the Sivaliks within the Bhabar tract, between 29° 31' and 29° 35' N, lat., 70° 41' E. long. According to Ali and Ripley (1978), the Himalayan greyheaded fishing eagle *Ichthyophaga nana plumbea* extends from the lower foothills upto 2400 m, optimally between 1000 to 1500 m in western Himalayas and under 1000 m in the eastern Himalayas. The middle

reaches of the Ramganga river flow through most of the Park. The topography is undulating, varying in altitude from 200 to 1000 m, which is the preferred range and habitat of the species. The Park is one of the strongholds of the species in India. In Kumaon the species was never seen above 1000 m and prefers rivers with forested banks. Sibley and Monroe (1990) treat it as a separate species *Ichthyophaga humilis*; now widely accepted. Kumaon comprises the four hill districts of Almora, Nainital, Udham Singh Nagar and Pithoragarh in northern Uttar Pradesh 29° N, 80.1° E and 30.1° N, 80.5° E.

From 1991 - 96 the greyheaded fishing eagle bred unsuccessfully. Eggs from seven nests monitored during this period did not hatch, while three nests hatched, young ones were either found dead in the nest, or disappeared within a week of hatching. Eggshell fragments which were collected from one nest in April 1991, were deformed. Thinner than normal eggshells, were analysed in the U.S. by Dr. Robert W. Risebrough of The Bodega Bay Institute, California. Since no yolk remnants or membrane fragments remained on the shell, a quantitative analysis that could be compared with data in the literature was not possible. Nevertheless, a number of organochlorine compounds were detected; their ratios provide clues to the local contamination pattern in the area inhabited by the eagles.

The parent DDT compound, that is the insecticidal ingredient, p,p'- DDT, constituted 36% of the DDT compounds measured; the amount of o,p'- DDT, the minor ingredient in the original DDT mixture, was 10% that of p,p'-DDT. The relatively high amounts of these two compounds indicate recent DDT applications in local or nearby areas; the evident thinning of the shell is most likely an effect of DDE, usually the principal metabolite of DDT in the environment and the compound considered primarily responsible for shell thinning. PCB congeners and dieldrin were detected, but at relatively low levels of about 6% and 2%, respectively, of the total DDTs. The dieldrin levels, however, are significant. Dieldrin, which is highly toxic to birds of prey, has been implicated in the population decline of raptors in Europe and North America (Cooke *et al.* 1982, Newton 1979, Risebrough 1989, 1994). Shell Chemicals, the manufacturers, have stopped its manufacture and sale anywhere in the world. Locally, it is most likely derived from aldrin, which until recently atleast, has been widely used in northern India. These contaminants could have been passed on only through the prey base, which for this species is solely fish. The presence of these contaminants in the local riverine food web is, therefore, a plausible cause of atleast some of its unsuccessful breeding attempts, in Corbett National Park.

On the higher reaches of the Ramganga, the densely populated hillsides are covered with intensely terraced cultivation. Information obtained from agricultural supply shops and farmers indicate that pesticides are used on a large scale, in order to control agricultural pests. The contaminants probably run off into the water system during the heavy monsoon which the region experiences.

The burgeoning human population especially along hillstreams and rivers is having a direct impact on the fishing eagle; through over-fishing (using several illegal methods such as extensive use of pesticides to poison fish and dynamiting upstream beyond the Park's northern boundary), damming of rivers and degradation, or complete destruction of riverine forest, directly affecting the species through loss of nesting habitat. Monitoring the reproductive success of the local population of the eagle in Corbett is continuing and the results of subsequent analysis for organochlorines is being carried out.

The species is probably seriously threatened at Corbett and likely to be similarly affected throughout its range in India. Besides the negative impact from chemical contamination, this mainly sedentary species is fully dependent on the Himalayan riverine system and further at risk due to loss of habitat and disturbance in the upper limits of its range.

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October 28, 1995 RISHAD NAOROJI
Godrej & Boyce Mfg. Co. Ltd.
Godrej Bhavan, 4A, Home Street,
Mumbai 400 001,
India.

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FIRST BREEDING RECORD OF THE COLLARED FALCONET *MICROHIERAX CAERULESCENS* FOR THE INDIAN SUBCONTINENT IN CORBETT NATIONAL PARK, UTTAR PRADESH[1]

RISHAD NAOROJI[2]

(With one text-figure)

Key Words: collared falconet *Microhierax caerulescens*, breeding record, courtship, incubation, Corbett, India.

Little is known about the collared falconet *Microhierax caerulescens* which is distributed in India throughout the lower Himalayan foothills from Garhwal eastwards to Assam, Northeastern hill states and Arunachal Pradesh usually upto 900 m, but has been recorded as high as 2000 m. Previously recorded from the Terai, where most of its former habitat has now shrunk or disappeared, it is a deciduous to moist-deciduous and evergreen forest dwelling species, most often observed hunting in man-made clearings, natural open spaces and forest margins. It commonly forages in degraded secondary deciduous and semi-evergreen biotope. Breeding within Indian limits has not been previously recorded for this comparatively common bird. The species appears to have been overlooked due to its small size (often mistaken for a passerine), its tendency for perching within forest (when not foraging), crepuscular habits and roosting and breeding within relatively high nest-holes of barbets, which to some degree may account for low detectability during the breeding season. However, the species is relatively conspicuous during courtship when frequent calls and associated self-evident demonstrative activity by a pair draws the observer's attention to the birds. Scant breeding data, however, is available on the extralimital Burmese race *M.c. burmanicus* (Baker, 1935; Ali and Ripley, 1978). This paper presents preliminary observations on courtship and incubation of this little studied raptor.

[1]Accepted May, 1997

[2]Godrej & Boyce Mfg. Co. Ltd., Godrej Bhavan, 4A, Home Street, Mumbai 400 001, India.

STUDY AREA

The study was carried out in Corbett National Park which lies between the two sub-Himalayan districts of Pauri and Nainital in Uttar Pradesh (29° 31'- 29° 35' N. lat., 70° 41' E. long.). It is situated in the lower central Himalayan Sivalik foothills (Fig. 1) which form part of the Bhabar tract. The central portion of the Park is located partly along a valley, between the lesser Himalaya to the north and the Sivalik ranges to the south. The middle reaches of the Ramganga river flow through most of the Park along the Patli Dun. About 10% of the grassland area has been submerged by the damming of the Ramganga river at Kalagarh, forming a large reservoir in the western corner of the Park, covering an area of about 80 sq. km, of which 42 sq. km is within the Park. A number of *sots* (springs) emerge from the numerous ridges which comprise the secondary source of water in the Park, after the Ramganga river. The altitude varies from 300 to 1040 m. The Park is contiguous with extensive reserved forest to the west and the east which probably facilitates lateral avifaunal movement. Further, its location at the foot of the lower Himalaya acts as a meeting ground for avian species of high altitude and plains, which account for its species richness and diversity.

Three main vegetation zones exist. The forest, grassland (locally called *chaur*) and the Ramganga riverine valley. Though 110 species of trees have been recorded, the dominant tree species is sal *Shorea robusta* forming almost pure forest stands. There are six major flat grasslands holding

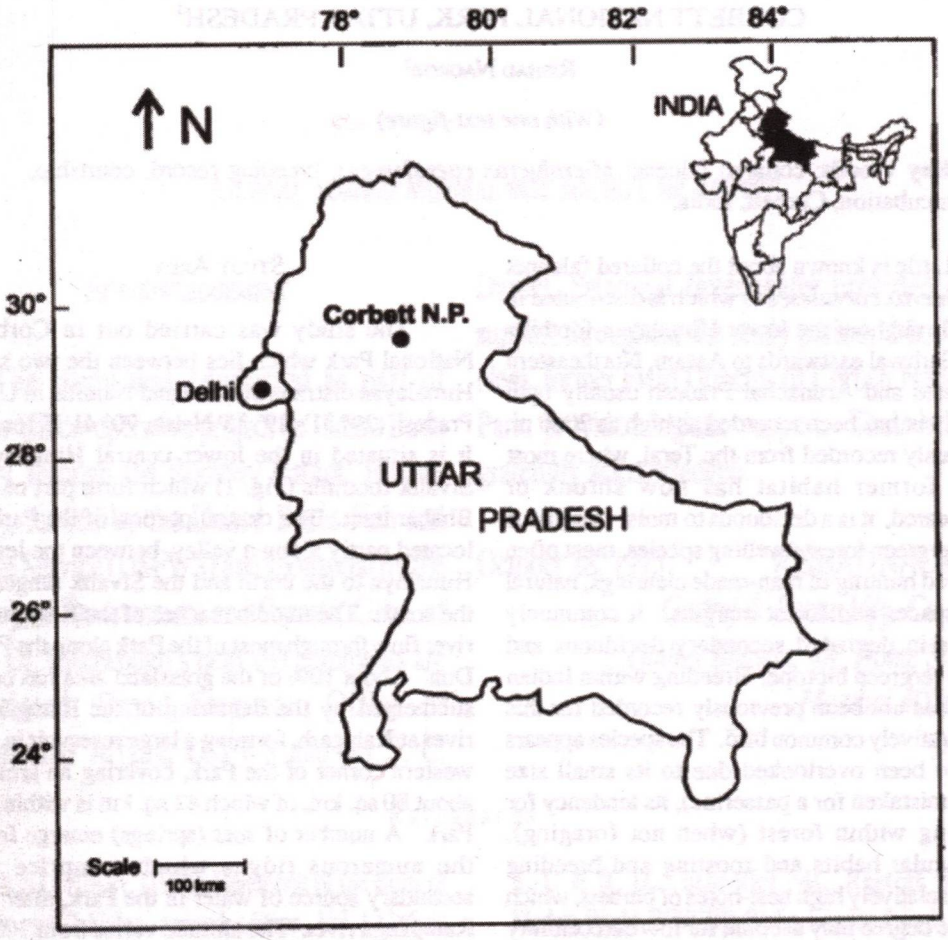

Fig. 1. Map of Uttar Pradesh and location of Corbett National Park

thirty-seven species of grasses. The largest grasslands are around Dhikala and Khinnanauli. The main forest types are a mixture of deciduous, tropical and subtropical. Sal dominates the moist deciduous biotope in the northern region of the Park. The biotope in the southern half of the Park, especially along the Sivalik hills, is dry deciduous. These three zones account for the genetic richness (both floral and faunal) and biogeographic diversity of the area. The river bed, the high banks and islands are colonised by sheeshum *Dalbergia sissoo*. *Lantana camara* is spreading unchecked, and is likely to adversely affect the native vegetation by suppressing the regeneration of sal and other herbaceous species. *Cannabis sativa* (bhang) grows profusely in parts of the grassland and in open areas. Bamboo clumps occur frequently in the Park on the higher hill slopes. Chir *Pinus roxburghii* are confined in small numbers on some of the highest ridges, eg., the Sultan watch tower. A nest was located in moderately dense sal forest, 300 m from the grassland. The leaf fall and shedding of dried sal flowers was in progress at the outset of the courtship period.

bond. During the late courtship period the pair would occasionally deposit leaves in the nest-hole without any ritual.

Mating usually followed the courtship display and continued well into the incubation period. Mating was more frequent throughout courtship than during the early incubation period. Once mating was observed 20 m from the nest, but mostly it occurred within a few metres of the nest.

During incubation no extended courtship ritual preceded mating. Either one of the incubating adults, generally the female, would fly from the nest-hole to where its mate was perched. The pair would either briefly touch bills with much chattering or immediately commence copulation, which was accompanied by a rapid high-pitched chatter. Duration of copulation was 4 to 8 seconds (n=9), the male maintaining balance with much wing-flapping. Once the male mounted the female for almost a minute, though actual mating lasted only a few seconds. Copulation was mostly observed during the mornings of both the courtship and early incubation periods.

Incubation

A total of about 33 observation hours were spent monitoring incubation between 30th April to 15th May,1993. The attentiveness of the female at the nest increased markedly after 28th/29th April. Prior to these dates, incubation was sporadic and its duration gradually increased till the complete clutch was laid. Tight incubation commenced on 30th April. Both adults incubated, the female for longer periods 82%, male 12%, while the eggs were unattended for 6% of the observation period. The longest incubation stint by the male was, an hour. Once during the early incubation period, after steady incubation had commenced, the nest was unattended for 36 mins from 0645 to 0721 hrs. During incubation dried sal leaves were occasionally deposited in the nest-bole by the pair (male n=3, female n=1). This activity was performed primarily by the male for both courtship and early incubation periods. When both adults were observed to be in the nest-hole (n=7, usually during the afternoon), the female invariably incubated, with the male settled just within the nest-hole entrance (for durations ranging from 2 mins to 2.38 hrs). All sounds (whether human, animal or bird) were immediately investigated by peering out of the nest-hole, or flying momentarily to a nearby perch to assess the potential danger, before returning to the nest.

By the fourth or fifth day of incubation, an increasing patch of droppings on the lower rim of the nest-hole, on the branch below, and favourite perches in the nest-vicinity were indicative of an active nest. During the afternoon hours, the male would often settle just within the nest-hole entrance, instead of the usual perches used during the mornings and evenings. Once the male remained mostly within the nest-hole entrance from 1500 to 1900 hrs except for two short bouts (outside the nest) totalling 72 mins. The female initiated changeovers by flying to the male, chattering constantly. She sidled up to him, and after brief bill touching, nudging and finally shrill vocal urging, the male would be induced to commence incubation. The pair suddenly abandoned the nest on 17th May, (after 19 days of incubation) and vanished thereafter. Mynas and parakeets repeatedly investigated the deserted nest-hole, but did not occupy it.

Calls

In greeting or prior to mating, the pair would chatter in unison. Frequent, shrill, piercing whistles accompanied the courtship ritual and mating. A typical, thin, rapid high-pitched chatter (in unison) *Che-che-che-che-che* was associated with mating, while similar calls were delivered singly in slower, shorter, staccato whistles. Many of the male's activities (eg. relieving the incubating female, hunting, prey visits, nest

defence) were initiated through calls by the dominant female. She vocalised more frequently than the male (89% versus 11% by the male), and her calls were more high pitched.

High pitched, quickly repeated calls (suggesting urgency?) that subsequently lapsed into single note calls were mostly used to summon the male. Persistent calling by the female resulted in the male sometimes flying to the nest-hole perch with prey. She would greet him with a shrill *twe, twe, twe...* in rapid succession, the call rising to a crescendo, then varyingly repeated. The incubating female vocalised solely from the nest-hole entrance, never from within the incubation chamber.

Roosting

The pair roosted together in the nest-hole generally by 1920 hrs about 30 mins after sunset or occasionally earlier. The female always incubated at night, while the male roosted just within the nest-hole entrance.

Interspecific Conflicts

The competition for nest-holes by other species was severe during the incubation period, and even a momentary absence from the nest often invited investigation from other hole-nesters. The pair had to repeatedly repel attempts mostly by parakeets, mainly rose-ringed *Psittacula krameri*, red-breasted *Psittacula alexandri* and common mynas *Acridotheres tristis* from investigating their nest-hole. The male was once displaced from his perch by an Indian tree-pie *Dendrocitta vagabunda* and twice engaged in an extended dogfight with a black drongo *Dicrurus adsimilis*. The female occasionally broke off incubation to drive away parakeets and mynas.

Food and Hunting

Only three prey visits to the nest were observed during the study period. One fresh and two cached prey items were brought to the nest solely by the male, relieving the female (once for upto 23 mins) at incubation while she fed away from the nest. Prey was not taken into the nest-hole, but eaten mainly on the nest-hole branch or nearby perches.

Though the collared falconet takes a variety of prey, mainly insects and lizards (Ali and Ripley 1978, Baker 1935, Brown and Amadon 1968), only birds were observed being brought to the nest. Prey was cached on the nest-hole branch and on other frequently used bare horizontal branches in the nest vicinity. The male mostly hunted during the late courtship stage (though sometimes with the female), and solely during the incubation stage. The male foraged in the forest around the nest and in the nearby *chaur* upto at least 200 - 300 m from the nest.

Discussion

The sudden termination of incubation and disappearance of the pair remains a mystery. In all likelihood, the eggs may have been addled and the pair lost interest. Predation too cannot be ruled out.

Baker (1935) collected a full clutch of eggs from a nest on 14th April from Burma, which perhaps indicates a later nesting period in the Central Himalayan foothills relative to that in Burma, or late nesting by the pair under observation. Although the nest was not physically checked to avoid disturbance, it is likely that the clutch was completed at about the time the female's attentiveness at the nest increased. The full clutch was, therefore, incubated for about 19 days before being abandoned.

Clumping and allopreening is apparently not restricted to the breeding period of the species, as observed by Sparks (1965) in a non-breeding captive pair.

It has been suggested that clumping and allopreening indicate the social nature of the species and the genus as a whole, and may be linked with aggression and autopreening

behaviour, acting probably to reduce aggressive behaviour and facilitate clumping, and that the species may even breed cooperatively (Sparks 1965, Kemp and Crowe 1994). In a subsequent study, Kemp and Van Zyl (in prep.) report co-operative breeding in the race *burmanicus*, having observed two almost fledged young attended to by five adults, and fed by at least three — two possible males and the breeding female. I observed no signs of aggression, the pair under observation nested in isolation from congenerics. One explanation could be that at Corbett the species has a naturally low breeding population density or it could be a straggling breeder. The species is evidently social, moving about in small parties in the non-breeding season, and frequently observed at Corbett between October and February.

The information presented here adds much to our basic knowledge of the biology of the species, though more information is required on the breeding biology and ecology of the species, the full extent of the breeding period, duration and commencement of courtship, incubation and nestling periods and detailed role of sexes during the breeding period. Prey and prey preferences throughout the breeding period, preferably from different areas should be studied as the limited hunting and prey data suggests that when breeding, the species supplements its normal prey (mainly insects but also lizards) with larger prey *viz.* small birds. Nestling success and average number of young reared, whether co-operative breeding does occur and to what extent, habitat requirements and territory; hunting success and dependency period of young are all areas for further investigation.

Acknowledgements

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STATUS OF DIURNAL RAPTORS OF CORBETT NATIONAL PARK WITH NOTES ON THEIR ECOLOGY AND CONSERVATION[1]

RISHAD NAOROJI[2]

(With one map)

Key words: Raptors, status, conservation, checklist, Corbett National Park, Uttar Pradesh, India.

Out of a total of 69 species of diurnal raptors reported from the Indian subcontinent, 51 were recorded from Corbett National Park (CNP) in Uttar Pradesh, India, over a 6 year period. The status of these raptors and the conservation problems which could be faced by some of the resident species are discussed. With the exception of the lesser fish eagle *Ichthyophaga humilis*, none of the resident species appear threatened, but continued alteration of the habitat through deforestation and habitat degradation outside the Park is likely to have an adverse effect on the future status and distribution of many species. The Park's overall high avian (and raptor) diversity arises from its immediate proximity to the Himalayan foothills, and represents a wide array of Himalayan avifauna, partly as a result of altitudinal movement. Many raptor species in CNP are either resident or local summer migrants to the Himalayan foothills up to at least 2000 m. A number of high altitude raptors are winter visitors or vagrants to the Park. As the Park and adjacent foothills form one ecosystem, facilitating movement of species from the middle Himalayan foothills to the *Bhabar* tract and vice versa, the status of the species listed for the Park is also applicable to the foothills.

INTRODUCTION

It is surprising that in an area as rich as Corbett National Park in biotic diversity supporting probably the richest variety of bird species in India, no major ornithological studies have been conducted. No extensive literature (except on flora, Pant 1976, Pant *et al.* 1981) exists, though it has long been a favourite locale with birdwatchers. For a long time, the emphasis has been on tiger protection and conservation, and only during the last few years has the great diversity of birds in the area been appreciated. The forest department, whose activity revolves mainly around managing the tiger, is now aware of CNP's unique ornithological heritage, and the great range of birds of prey that it supports. Regular birdwatching and identification camps organised by the forest department are now a yearly feature, and the guides and staff have become more aware of the importance of raptors.

A three month survey for raptors in protected areas covering most of the ten principal biogeographical zones (except the northeast) identified by Rodgers and Panwar (1988) was conducted by William Clark, Dr. Vibhu Prakash and I from January to March 1990. The high numbers of many lesser known resident and migratory raptors observed in CNP influenced our choice of the Park for breeding studies on the rarer resident species.

STUDY AREA

Location and Habitat

Corbett National Park, comprising an area of 920 sq. km extends across two sub-Himalayan districts of Pauri in Garhwal and Nainital in Kumaon, Uttar Pradesh, (Map 1) (29°31' to 29°35'N lat. 78°46' E long.). It is situated in the

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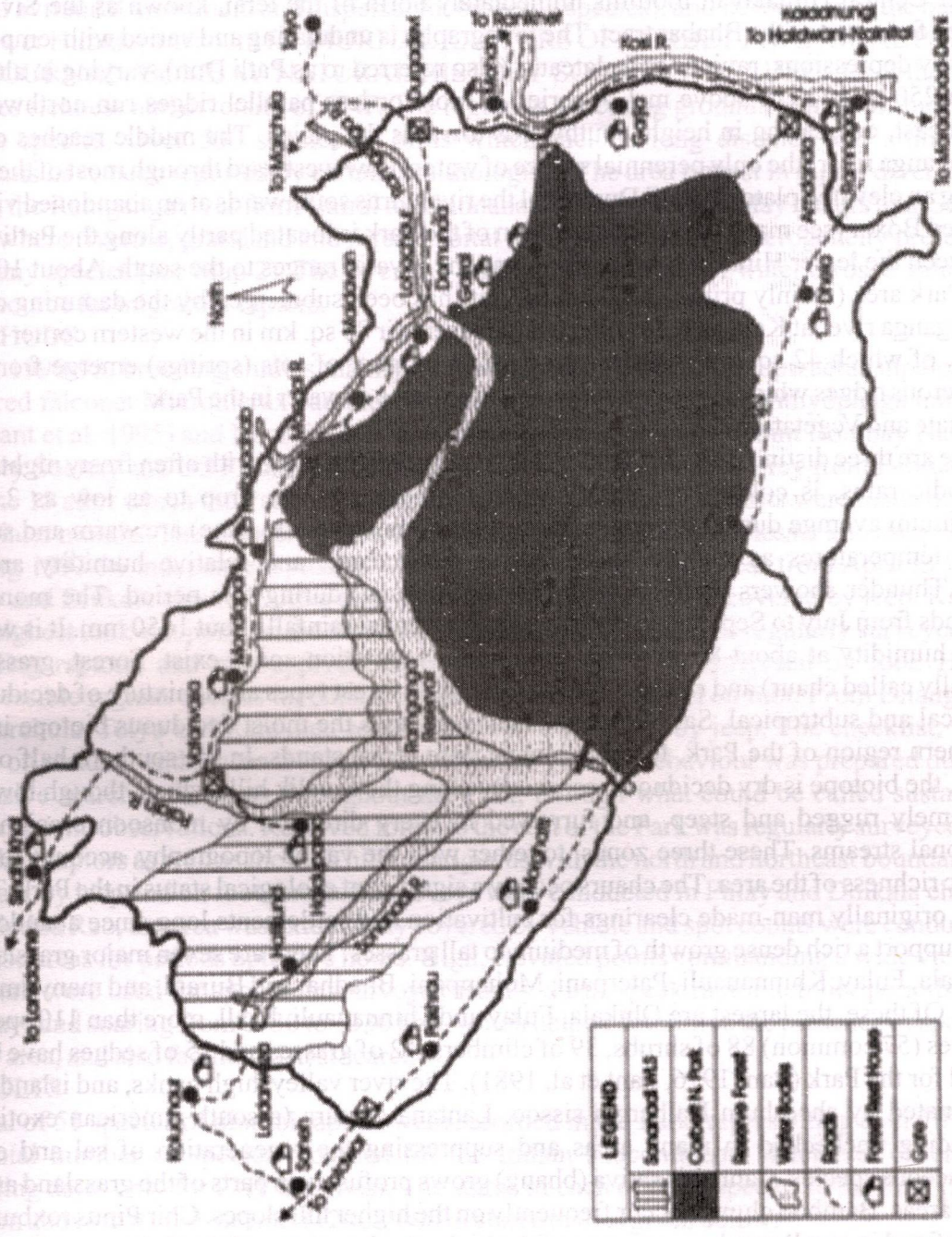
[2]Godrej & Boyce Mfg. Co. Ltd. Godrej Bhavan, 4A, Home Street, Fort, Mumbai 400 001.


Kalaadhungi
To Haldwani-Nainital
To Ranikhet
Kosi R.
Gate
Amdanda
Sarmoli
To Mandalsoda-Delhi
Dhela
Tokyo
To Marchula
Dungadevi
Gate
Lohachaur
Domunda
Gate
North
Maldevan
Mandalpoh
Ramgarya Reserve
Vidarvasa
Sindhi Khal
To Langasaina
Halduchaur
Sonkh
To Kotdwar
Lalakhadda
Halduchaur
Kalaudanda
Mangoli
Pakhou
LEGEND
Sonanadi WLS
Corbett N. Park
Reserve Forest
Water Bodies
Roads
Forest Rest House
Gate

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lower Central Himalayan foothills immediately north of the terai, known as the Sivaliks, which form part of the Bhabar tract. The topography is undulating and varied with emporary marshy depressions, ravines and plateaus, (also referred to as Patli Dun), varying in altitude from 250 to 1040 m above msl. A series of more or less parallel ridges run northwest to southeast, decreasing in height southwards towards the plains. The middle reaches of the Ramganga river (the only perennial source of water) flow westward through most of the Park along an elevated plateau (Patli Dun) until the river turns southwards at an abandoned village named Boxar (see map). The central portion of the Park is located partly along the Patli Dun, between the lesser Himalaya to the north and the Sivalik ranges to the south. About 10% of the Park area (mainly prime grassland habitat) has been submerged by the damming of the Ramganga river at Kalagarh, forming a large reservoir 80 sq. km in the western corner of the Park, of which 42 sq. km is within the Park. A number of sots (springs) emerge from the numerous ridges which comprise the secondary source of water in the Park.

Climate and Vegetation

There are three distinct seasons: winter (November to February), with often frosty nights and periodic rains, is coldest in January when temperatures can drop to as low as 2.5oC, maximum average during the day is 25oC. Summers (March to June) are warm and sultry, with temperatures as high as 44oC during May/ June, and relative humidity around 57%.Thunder showers and hailstorms are not unusual during this period. The monsoon extends from July to September, with an average annual rainfall about 1650 mm. It is warm, with humidity at about 80 to 90%. Three main vegetation zones exist. Forest, grassland (locally called chaur) and riparian forests. The main forest types are a mixture of deciduous, tropical and subtropical. Sal Shorea robusta dominates the moist deciduous biotope in the northern region of the Park, forming almost pure forest stands. In the southern half of the Park, the biotope is dry deciduous, especially along the Sivalik hills which, though low, are extremely rugged and steep, and furrowed in every direction by monsoon erosion and seasonal streams. These three zones, together with the varied topography, account for the biotic richness of the area. The chaurs occupy a significant ecological status in the Park. They were originally man-made clearings for cultivation and settlements long since abandoned, and support a rich dense growth of medium to tall grasses. There are seven major grasslands: Dhikala, Fulay, Khinnanauli, Paterpani, Mohanpani, Bhadhai and Bijrani, and many smaller ones. Of these, the largest are Dhikala, Fulay andKhinnanauli. In all, more than 110 species of trees (57 common) 88 of shrubs, 39 of climbers, 42 of grasses and 15 of sedges have been listed for the Park (Pant 1976, Pant et al. 1981). The river valley, high banks, and islands are dominated by sheeshum Dalbergia sissoo. Lantana camara (a south American exotic) is spreading unchecked in many areas and suppressing the regeneration of sal and other herbaceous species. Cannabis sativa (bhang) grows profusely in parts of the grassland and in open areas. Bamboo clumps occur frequently on the higher hill slopes. Chir Pinus roxburghii is confined in small numbers on some of the highest ridges (around the Sultan watch tower) and in compartment No. 9/10 at Ghilmodya sot. For details on flora see Pant (1976), Pant et al. (1981).

Avifauna

The diverse habitat types, contiguity with reserved forest to the west and the east (facilitating lateral avifaunal movement and dispersal for breeding species), and its location at the base of the lower Himalaya account for DIURNAL RAPTORS OF CORBETT NATIONAL PARK 390 JOURNAL, BOMBAY NATURAL HISTORY SOCIETY, 96(3) DEC. 1999 the high species richness and diversity of CNP. The region is a meeting ground for high altitude and plains species. Over 500 species of birds which include long distance and altitudinal migrants have been reported by certain ornithologists. The area richest in raptor diversity is along the Ramganga river from Gairal to Khinnanauli, Dhikala and Fulay chaurs and Gethia Rao, where riverine, grassland and forest habitat together create the heterogeneity preferred by many species (see Map 2). The river and lake attract a variety of water birds, a valuable food source for migratory raptors.

METHODS

From 1990-93, breeding studies mainly on the mountain hawk-eagle Spizaetus nipalensis, collared falconet Microhierax caerulescens and the lesser fish-eagle Ichthyophaga humilis (Samant et al. 1995) and Naoroji (1997a, b) were carried out under a joint Bombay Natural History Society and US Fish and Wildlife Service project on Birds of Prey from February 1 to June 15 after which the Park closes for the monsoon. Occasional visits were made during the winter months. These observations form part of breeding studies of lesser known species. During 1993-96 independent studies were conducted by me each year from April to June. Fulay and Dhikala chaurs, Gethia Rao, and Gairal to Dhikala were covered by jeep. Kanda (the highest look-out point on the northern boundary of the Park) was regularly surveyed for breeding raptors, and was approached by jeep and the ridge traversed on foot. Hilly, inaccessible regions such as the Sultan watch tower were covered on foot. From Dhangarhi to Marchula, Tolyo and Ranikhet, regular surveys were made by jeep. The checklist, with notes on resident and seasonal species, habitats and general behaviour was prepared during extensive searches for nests throughout the Park, through what could be called sustained opportunistic observations. Reserved forest to the east of the Park was regularly surveyed for breeding raptors as well as the high hills contiguous with the north and northeast boundary of the Park by jeep and on foot. Intensive surveys were conducted in Fulay and Dhikala chaurs and Gethia Rao, the area was extensively covered by vehicle and spot counts were conducted in these areas for periods upto five hours. High, elevated points commanding a wide view of the Park were used for spot count surveys (usually during peak raptor activity periods e.g. displays and soaring from 0930 to 1330 hrs), which helped determine the presence of species in the area, and also facilitated nest searches.

RESULTS

A total of 51 species of diurnal raptors were recorded in the Park, representing over 70% of the total number of species recorded for the Indian subcontinent. Whenever observed, breeding dates only for CNP are given. The status of each of these species in the Park (250-1100 m above msl) and the hills (1200-2000 m above msl) is given below:

STATUS OF DIURNAL RAPTORS IN THE PARK

Legend

@ - Not recorded by me but by reliable observers. Species recorded in similar habitat in

Nepal (Inskipp 1989).
- Foraging up to 2500 m.
* - Breeding in oak forest at 2400 m.
C - Common (regularly seen).
FC - Fairly common (less than above).
SB - Straggling Breeder.
? - Status or abundance uncertain.
R - Resident
M - Migrant
V - Vagrant
B - Breeding
LM - Local Migrant
PM - Passage Migrant
— - Not Present
UnC - Uncommon (rarely seen)
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Osprey Pandion haliaetus: Migrant, commonly observed along the Ramganga river and in the vicinity of the dam from October to April. Earliest arrivals sighted by end September. A few individuals observed each year staying on at least till the Park closes in mid June. When or whether they leave the Park is not known. Status: Park - M; Hills - PM. Black Baza Aviceda leuphotes @: Possible vagrant. Not seen during the study but one sighting reported by a reliable observer (Harak Singh, pers. comm. Dy. Ranger, Dhikala). Status: Park - V; Hills - —. Oriental Honey-buzzard Pernis ptilorhynchus: Resident. Commonly seen throughout the Park. Displays observed through March and April, pairs incubating mostly in May. Appears to be a summer visitor to the hills up to 2000 m where breeding appears unlikely as the area is now mostly denuded, except where the southern slopes of forested foothills and reserved forest in the Bhabar tract are contiguous. Status: Park - C,R,B; Hills - LM,R?. Black-shouldered Kite Elanus caeruleus: Fairly common in the grassland. Numbers fluctuate annually, possibly in relation to prey availability and accessibility. A few pairs may breed, but most exploit the grassland for foraging and appear to breed outside the Park. No nest was located. Status: Park - R?,LM,FC; Hills - LM,UnC. Black Kite Milvus migrans: Uncommon, found mainly around tourist centres such as Dhikala and Bijrani. One pair nest annually at Dhikala, commencing breeding in March. Status: Park - UnC,B; Hills - R. Black-eared Kite M.m. lineatus: Migratory and uncommon. Status: Park - M,UnC; Hills - UnC. Brahminy Kite Haliastur indus. Uncommon, restricted mainly to the dam area. One pair observed nesting at Dhikala during February/March 1992. Status: Park - UnC,B; Hills - —. Pallas's Fish-eagle Haliaeetus leucoryphus: Visits the Park from mid-September to May to breed. Common along the Ramganga river where pairs take up residence along stretches of the river, repairing and re-using their traditional nests each year. Often observed pirating fish from large cormorants Phalacrocorax carbo, osprey and lesser fisheagle Ichthyophaga humilis. The immediate nesting area is actively defended. Foraging and nesting territories probably vary with the food supply. A pair nesting outside the Park along the Kosi river

between Mohan and Kumeria at around 300 m (where food was apparently scarce) foraged over longer distances than pairs within the Park. The adults were occasionally observed flying over Bhounkhal village (1400 m) atop a ridge whose eastern face rose directly above the Kosi to the Ramganga river (below the western face), a few kilometres upstream of Marchula. Within the Park pairs foraged along 4 to 7 km stretches of river, intruding into the peripheral territories of other pairs. Most birds leave by May, the odd adult or subadult observed staying on at least till the Park closes in June. Status: Park - M,B,C; Hills - PM. White-tailed Eagle Haliaeetus albicilla: Occasional, individuals (adults and mainly juveniles) visit the Park for a few days in winter. Usually seen along the Ramganga, mostly in Dhikala and Fulay chaurs feeding on carrion or pirating food from the Pallas's fish-eagle, Aquila and other smaller raptors. Also reported from Loha Chaur along the Mandal river on the northern boundary of the Park (Shahid Ali, pers. comm.). Status: Park - M,O; Hills - —. Lesser Fish-eagle Ichthyophaga humilis: One of the most endangered raptors in India and the species most at risk in Corbett. It is restricted to the Ramganga riverine habitats where it is fairly common. It feeds exclusively on fish and favours forested habitat adjacent to fast flowing streams and rivers at altitudes from 300 to 2400 mDIURNAL RAPTORS OF CORBETT NATIONAL PARK
392 JOURNAL, BOMBAY NATURAL HISTORY SOCIETY, 96(3) DEC. 1999 (Ali and Ripley 1987, Baker 1932). Recent surveys by me in the Kumaon hills have indicated that viable habitat above 1000 m has shrunk in the middle Himalaya, and that the species now mainly ranges between 300 m and 1300 m. Much of its former habitat in the middle Himalayan ranges has been denuded and additionally contaminated by pesticides. The direct effects of deforestation and changing land use patterns which have polluted the Himalayan riverine ecosystem threaten the species' survival. Besides Kumaon and Garhwal, Nepal's river systems have similarly been affected (Ormerod, 1990), and the species may be under similar threat in other parts of its range. Thinner than normal egg shell fragments collected from one nest analysed by Dr. Robert Risebrough of USA contained significant levels of DDT and dieldrin (Naoroji 1997b). In 1993, no nest was located. Courtship commences by February, incubation by mid March. Nests were closely spaced, often not more than 2 km apart. This specialised feeder is shy and easily disturbed at the nest, and successful breeding is further limited by nest predation by the common langur Presbytis entellus, yellow-throated marten Martes flavigula and food pirating by the Pallas's fish-eagle. Incubation was unsuccessful in seven nests located at Corbett. Two pairs hatched young, which did not survive for more than four to five days. One nest was located at Garjia on the Park's eastern boundary but incubation was unsuccessful. Observed occasionally along the Mandal river at the northern boundary of the Park and along the upper reaches of the Ramganga in the north-eastern buffer zone of the Park from Domunda to Marchula. Its breeding behaviour will be described in a separate paper under preparation. The species is now rare outside the Park with only two sightings in six years along the highly disturbed Kosi river. Status: Park - FC,R,B; Hills - R,B,UnC. Bearded Vulture Gypaetus barbatus. A rare vagrant to the Park in winter. A single individual observed flying over Dhikala across to Kanda (Harak Singh, pers. comm.). Relatively common from 1500 m above msl and above, even more abundant at higher altitudes. The massive denudation of the middle ranges has enabled this open habitat species

to expand its foraging range to lower altitudes (around 1000 m) wherever suitable hill habitat is available. Outside the Park, individuals (adults and immatures) sporadically observed by the author during winter and also April/May flying over degraded reserved forest at Bhalon (600 m), east of the Kosi river adjacent to high ranges. One immature observed from the Claridges resort along the Kosi river (Shahid Ali, pers. comm.). As long as food and safe nesting sites are available, the species will continue to prosper. Status: Park - V; Hills - FC,R,B. Egyptian Vulture Neophron percnopterus: A fairly common resident in the Park. Nests both on trees and on high eroded mud banks of the Ramganga and Kosi rivers. Nests are traditionally used each year if undisturbed. Nesting period stretches from end February/ March to early or mid June. Newly hatched downy nestlings have been observed from early to mid May. Breeds in the hills up to at least 2000 m. Status: Park - FC,R,B; Hills - R,B. Indian White-backed Vulture Gyps bengalensis: Commonest vulture in the Park, breeding in winter. Also summers (no evidence of breeding) in the middle foothills up to about 2000 m. Breeds from November to March. Status: Park - C,R,B; Hills - R,LM,C. Long-billed Vulture Gyps indicus: The race G.i nudiceps (resident in the foothills) is observed mainly in the northern sector of the Park, pairs breeding singly and solely on trees. Young fledge by early May but are nest dependent till early June. Status: Park - R; Hills - R. Himalayan Griffon Gyps himalayensis: Commonly seen local winter migrant to the Park from the surrounding hills where it breeds in summer. No nests observed in the hills

immediately to the north up to 1800 m. Status: Park - LM,C; Hills - C,R,B. Eurasian Griffon Gyps fulvus: Uncommon, seldom seen. Occurs singly in the Park and in adjoining reserved forest, mainly during the winter months. No evidence of breeding in the Park or adjoining foothills. Status: Park - M,R?,UnC; Hills - —. Cinereous Vulture Aegypius monachus: Migrant, mostly seen singly or in small groups of 3 to 4 on carcasses in the relatively open areas of the Park during the winter months from November to early March. Frequently observed in the chaurs around Dhikala (N and S of the Ramganga river) and along the northern boundary of the Park at Marchula, Chimtakhal to Tolyo and along the Kumeria - Ranikhet road. Status: Park - M; Hills - M,UnC. Red-headed Vulture Sarcogyps calvus #: Common throughout the Park and observed foraging up to 2500 m. It is equally at home in moist-deciduous forest or in the mix of degraded open country, pine and oak in the middle ranges. Status: Park - C,R,B; Hills - R,B,FC. Short-toed Snake-eagle Circaetus gallicus: A vagrant, opportunistic visitor to the Park for foraging. It was sighted only twice in six years during winter. The individuals foraged in the chaur for a few days and then left the Park. The species is fairly common in the agricultural areas beyond the Park's southern boundary where the habitat is more suitable. Occasionally seen quartering barren hill slopes up to 2000 m, where it is a local migrant. Status: Park - V; Hills - LM. Crested Serpent-eagle Spilornis cheela #: One of the commonest raptors in the Park — an opportunist and adaptable species (Naoroji, 1994b). Found throughout the lower and middle Himalaya up to 2600 m and probably higher in its northeastern range. Though the species usually builds its own nest, three pairs were observed over three consecutive seasons breeding in unused nests of the Indian white-backed vulture, changeable and mountain hawk-eagles. In Corbett, the prey

varied from the usual snakes, lizards and rodents (Naoroji and Monga 1983, Naoroji 1985), occasionally to birds e.g. jungle babbler Turdoides striatus, common myna Acridotheres tristis, and once a flying squirrel Hylopetes fimbriatus (Naoroji, 1994b). A pair were observed fishing for fingerlings in shallow, tarsus-deep water. Inspite of its commonness, none of the eggs in the three nests located hatched successfully. The species is easily driven off the nest by the common langur which, along with the yellow-throated marten, feed on the eggs. Courtship displays were observed from February to early March, incubation by end March through April or variably later in the Park. Unsuccessful nesting may be due to the high rate of nest predation, and possibly the cumulative effect of pesticides ingested from the food chain through predation on water snakes. Nesting success was higher outside the Park, in relatively unprotected, degraded reserved forest close to human habitation, and this was probably due to a lower density of natural predators. Status: Park - C,R,B; Hills - R,B,LM. Harriers: are migratory (mainly passage migrants), seen sporadically, either individually or in twos and threes, in open chaurs during winter. Western Marsh Harrier Circus aeruginosus: A few individuals can be observed quartering the chaurs along the banks of the Ramganga river and near the reservoir. Status: Park - M; Hills - PM. Eastern Marsh Harrier Circus spilonotus: A rare vagrant. The only confirmed sighting of a juvenile quartering the Dhikala chaur and Gethia Rao in March is a range extension, as it has not been previously recorded west of Assam (Ali and Ripley, 1987), and a record for the Park (Naoroji, 1994a). Status: Park - V; Hills - —. Hen Harrier Circus cyaneus: Infrequently observed, does not stay continuously throughout the winter, but stops over in the Park for short periods. More common in the hills. Status: Park - M,UnC; Hills - M,FC. DIURNAL RAPTORS OF CORBETT NATIONAL PARK

394 JOURNAL, BOMBAY NATURAL HISTORY SOCIETY, 96(3) DEC. 1999 Pallid Harrier Circus macrourus: Infrequent winter migrant. Stops over in the Park for short periods, probably on passage. Status: Park - M; Hills - PM. Montagu's Harrier Circus pygargus: Status same as Pallid Harrier. Status: Park - M; Hills - PM. Crested Goshawk Accipiter trivirgatus @: Uncommon, not observed by me, but probably resident and has been reliably reported (Harak Singh, pers. comm.). Status: Park - UnC,R; Hills - —. Shikra Accipiter badius: The commonest resident Accipiter, frequently observed throughout the Park. Breeds in the hills up to 1400 m (Ali and Ripley 1987) but frequently observed during summer at 2000 m. Status: Park - C,R,B; Hills - R,LM. Besra Accipiter virgatus: Mainly a local migrant from the higher foothills, where it breeds. Status: Park - LM; Hills - R,B. Eurasian Sparrowhawk Accipiter nisus: Migratory in the Park, the resident race probably breeds at higher altitudes above 2000 m. Status: Park - LM; Hills - R?B? Northern Goshawk Accipiter gentilis: Migratory. Rare, one adult seen in May at Kanda (1000 m). A record of the species nesting in Garhwal at 1000 m (Baker, 1932), lends credence to the belief that sporadic breeding may occur in the lower foothills. Status: Park - LM; Hills - LM,B?. White-eyed Buzzard Butastur teesa: Uncommon, only seen occasionally in the open grassland, which it exploits for foraging. It probably breeds outside the Park. A vagrant to the hills up to 2000 m (in summer) where excessive deforestation has probably extended its foraging range. Status: Park - UnC; Hills - V. Common Buzzard Buteo buteo: Both races are migratory and infrequently observed in the Park. The Steppe buzzard Buteo buteo vulpinus is

commoner; the Eurasian race Buteo buteo japonicus is uncommon and usually observed over degraded hill slopes to the north of the Park. Status: Park - M; Hills - M,PM. Long-legged Buzzard Buteo rufinus: Migratory and though not common, it is more frequently seen in the Park than the common buzzard. Status: Park - M; Hills - PM. Black Eagle Ictinaetus malayensis #*: Partial to hill forest. Found at low density throughout the Park, mainly north of the Ramganga river. Occasionally seen on the lower slopes of the hills (once observed at Gairal) but more frequently along the higher ridges such as at Kanda. It is also commonly associated with Oak forest up to 2500 m. Its status in the hills varies from area to area, determined mainly by the level of habitat degradation. Status: Park - UnC,R,B; Hills - FC,R,B. Lesser Spotted Eagle Aquila pomarina: Status within the Park is rare, with only one recorded sighting. A pair seen outside the Park in September 1991 near Kaladunghi along the margin of forest and cultivation (preferred habitat), were probably breeding. Two unidentified Aquila observed soaring and hunting at a distance over barren hill slopes interspersed with Oak (Quercus) and Chir Pinus roxburghii forest at Chaubattia, Ranikhet (1800 m) in end May 1993 and 1994 appeared, from a photograph, to be this species, according to William S. Clark, (pers. comm.). A single bird seen by Shahid Ali (pers. comm.) in reserved forest outside the Park near Chopda in March. Status: Park - LM,?,R?,O; Hills - V. Greater Spotted Eagle Aquila clanga: Uncommon migrant to the Park. Mainly observed around the Dhikala chaur perched on trees in the vicinity of the river and reservoir. A few juveniles, occasionally an adult, observed stopping over sporadically during winter. Status: Park - UnC,M; Hills - PM. Eurasian Tawny Eagle Aquila vindhiana: Rare both within and outside the Park. Not DIURNAL RAPTORS OF CORBETT NATIONAL PARK JOURNAL, BOMBAY NATURAL HISTORY SOCIETY, 96(3), DEC. 1999 395 observed by me but two sightings within and outside the Park (Samant et al., 1995) indicate its presence in the area. Two Aquila, possibly this species, were seen by me in early June, quartering the barren slopes below Almora at around 1200 m. Status: Park - O,LM?; Hills - —. Steppe Eagle Aquila nipalensis: Uncommon migrant, though seen more frequently than greater spotted, during stop overs. Mostly juveniles observed, and very occasionally adults. In the hills, hundreds of steppe eagles were observed on passage from end September to early November. Large numbers of steppe eagles were observed stopping over in November-December on onward migration and from mid- March and early April on return migration at municipal garbage dumps at Ranikhet and Nainital. Status: Park - UnC,M; Hills - C,M,PM. Imperial Eagle Aquila heliaca: Uncommon migrant, less frequently observed than the greater spotted and steppe eagles. Status: Park - O,M; Hills - PM. Golden Eagle Aquila chrysaetos: A rare winter vagrant to the Park. One individual observed in January by William Clark (pers. comm.) the main entrance at Dhangarhi. Two birds, an adult and an immature seen at Domunda on February 15, 1998 (Shahid Ali, pers. comm.). Occasionally seen foraging from 1800 m to 3000 m, where the increasing human population and resultant disturbance coupled with the degradation of the middle foothills have decimated its natural prey and safe nesting sites. It is commoner at higher altitudes (3000 m to the snow line) where inaccessible rock ledges provide safe nesting sites above the preferred mix of high-altitude meadows and coniferous forest where it procures its food. Status: Park - V; Hills - O. Bonelli's Eagle Hieraaetus fasciatus: Fairly common resident in the Park, commoner in the

hills north of the Park from 1000 m to 2000 m, where extensive degradation appears to have favoured the species. Three nests observed between Bhounkhal and Tolyo on chir pine. Though not observed, the species may also be nesting on suitable rocky ledges. Incubation begins by February, young usually hatch by end March and fledge by mid May. Status: Park - FC,R; Hills - C,R,B. Booted Eagle Hieraaetus pennatus: A sporadic winter visitor and passage migrant in the Park. Not very common, mostly observed soaring. Status: Park - M; Hills - PM. Rufous-bellied Eagle Hieraaetus kienerii: A forest dependent species favouring hilly tracts. Fairly common resident throughout the Park, both adults and juveniles seen up to 1000 m mostly observed soaring, rarely perched. Unfortunately, no nest was located. Found at comparatively low densities, and continued shrinking of its forested habitat could pose a threat to the species outside the Park. Status: Park - FC,R,B; Hills - —. Changeable Hawk-eagle Spizaetus cirrhatus: Common throughout the Park, mainly south of the Ramganga river; more frequently seen than the mountain hawk-eagle. Breeding coincides with that of the mountain hawk-eagle, variably from end February through March, when incubation commences, till the end of May, up to mid June when young fledge. Observed breeding outside the Park in degraded and disturbed forest habitat near human habitation, and also in undisturbed forest areas. Status: Park - C,R,B; Hills - —. Mountain Hawk-eagle Spizaetus nipalensis: A fairly common resident, mostly heard or seen perched in forest at the edge of a clearing. Rarely observed soaring. More commonly observed in hill forest in the northern section of the Park than in the southern portion. Nesting females of the northern race are extremely aggressive in nest defence, unhesitatingly making contact with intruders climbing trees within a radius of 20 to 30 m of the nest. Conflict usually arises when villagers DIURNAL RAPTORS OF CORBETT NATIONAL PARK 396 JOURNAL, BOMBAY NATURAL HISTORY SOCIETY, 96(3) DEC. 1999 lop trees in the vicinity of nests near villages, inviting determined attacks, sometimes resulting in the villagers destroying the nests. There are two known instances outside the Park near Chopda where women lopping branches were attacked without warning, fell and succumbed to their injuries. The species was also observed to be pugnacious and aggressive in nest defence against the numerous natural predators, mainly the yellow-throated marten Martes flavigula and the common langur Presbytis entellus. Within the Park it takes a greater number of the large Galliformes such as kalij pheasant Lophura leucomelana and red junglefowl Gallus gallus (which are more easily available), and smaller prey like parakeets, doves, mynas and tree pies. Outside the Park it subsists primarily on small birds, taking a lesser percentage of the scarcer Galliformes. The species' original countrywide distribution (Ali and Ripley 1987, Baker 1932) in the middle Himalayan foothills from 1400 m to 2500 m has shrunk due to massive deforestation and resultant scarcer prey. The available habitat may not be able to sustain a viable population except in certain pockets. In Kumaon, the species is now more commonly seen in the predominantly sal dominated Bhabar tract from 600 m to 1200 m, and only occasionally in the higher foothills. The only unmistakable sighting I have had in the Kumaon hills was at Munsiari, Pithoragarh dist. With continuing human pressure on the depleted forests of the Sivaliks and Duars — changing land use practices and repeated summer burnings — the mountain hawk-eagle may soon run out of habitat except in suitable protected areas within its former range. Breeds variably from Feb./Mar. to May. Status: Park

- FC,R,B; Hills - UnC,R,B. Collared Falconet Microhierax caerulescens: Observed mostly during winter (October-January), hunting at the edge of natural or man-made clearings in forest. Seen frequently at Dhikala watch tower, High Bank and at Dhangarhi. Outside the Park, observed during winter at Sitabani and once at Chopda village in May. Rarely observed in summer when it nests. Breeding status vague, perhaps a straggling or rare breeder in the Park. Only one nest was located over a three year study period and incubation was unsuccessful (Naoroji, 1997a). The species breeds in disused nest-holes of the large green barbet Megalaima zeylanica or the lineated barbet M. lineata. Breeding extends from end February to May. Status: Park - R,SB?,LM?; Hills - —. Lesser Kestrel Falco naumanni: Passage migrant, observed at Kumeria outside the Park (W.S. Clark pers. comm.). Status: Park - PM, Hills - PM. Common Kestrel Falco tinnunculus: Passage migrant, seen around September/ October, foraging in open grassland. The resident race F.t. interstinctus is a common breeder in the hills (Ranikhet) from 1500 to 3500 m, breeding recorded by me from March to June. Status: Park - LM; Hills - C,R,B. Amur Falcon Falco amurensis: Very occasional winter passage migrant. Observed once in April 1976 at Dhikala chaur by Shahid Ali (pers. comm.). In 1997, a flock of about 150 to 200 observed in Dhikala chaur (Rajiv Bhartari, pers. comm.). Status: Park - O,PM; Hills - — Eurasian Hobby Falco subbuteo: Migrant, mainly observed in the Park during winter in the Dhikala chaur but doubtless frequents similar open spaces within the Park. Over two seasons three adults were observed in April, May and June, perched on small boulders about 20 cm high in open grassland. From these look-out perches, they would hawk insects and hunt warblers and larks. Breeds in the hills north of the Park. A breeding pair located at Ranikhet at 1800 m in June. Status: Park - LM; Hills - R,B. Oriental Hobby Falco severus: On April 4, 1995, a pair was seen hawking insects in the late evening at Gethia Rao. Only one sighting DIURNAL RAPTORS OF CORBETT NATIONAL PARK JOURNAL, BOMBAY NATURAL HISTORY SOCIETY, 96(3), DEC. 1999 397 Peregrine Falcon Falco peregrinus: Migrant, a few individuals occasionally seen during winter, perched on dead trees and stumps in open areas within the Park in the vicinity of the Ramganga river, Dhikala chaur and the reservoir. Status: Park - M,UnC; Hills - PM. The resident Shaheen F.p. peregrinator is a forest dependent falcon, seen throughout the Park especially from high vantage points. Breeds on cliffs on the upper slopes of steep forested hills and up to at least 2000 m in the Himalaya (Ali and Ripley, 1987). Outside the Park seen between Chimtakhal and Kartkinow and frequently between Kumeria and Panua Deokhun on the main Dhangarhi - Ranikhet road. Status: Park - FC,R,B; Hills - R,B.

SUMMARY

Except for the lesser fish-eagle (status threatened in Garhwal/Kumaon) whose limited range in the lower Himalaya has shrunk and is still under pressure from pesticides, human encroachment and disturbance along its riverine habitat, the status of the raptors at Corbett appears to be secure at present. Due to its geographical location, Corbett Park harbours a high diversity of resident, long distance and altitudinal migrant raptor species. There is a high rate of natural predation affecting some of the less aggressive species, but most raptors remain vulnerable mainly to loss of forest cover and chemical contamination of the riverine ecosystem and agricultural areas outside the Park. Each of the species listed is susceptible to

these changes, some more than others. Constant population monitoring is essential, and if numbers are on the decrease, the cause and effect on that particular species could be ascertained before the trend becomes irrevocable. The most successful nesters were found to be the hawk-eagles, which had the largest territories and were more successful in fledging young than other large raptors within and outside the Park. However, habitat loss and fragmentation, coupled with human persecution throughout the Bhabar tract could seriously affect their future status. Open habitat species such as the various vultures, Bonelli's Eagle, Common Kestrel and the harriers have benefitted from the severe denudation of the lower foothills, with adverse consequences to the forest dependent species.

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